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Advertising Index, Last Page

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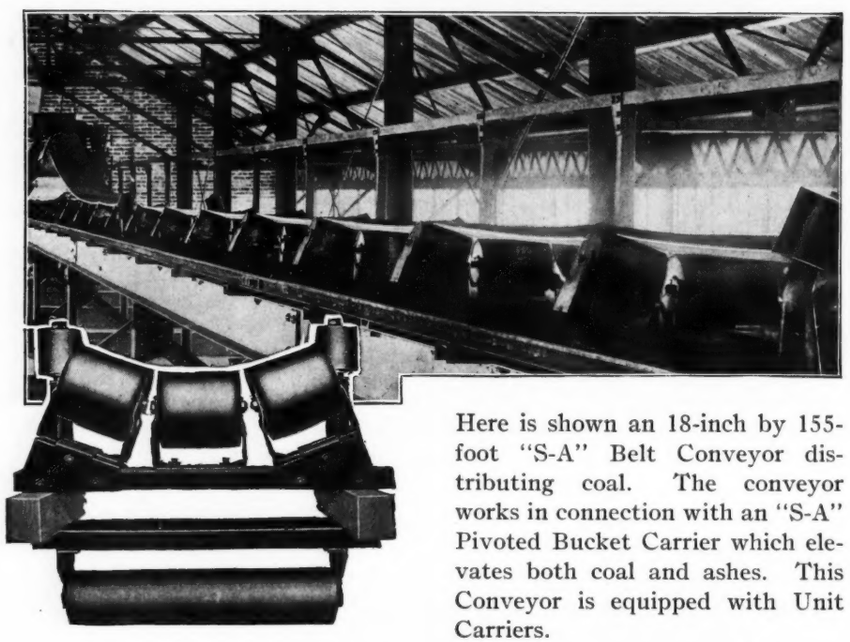

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Engineering and Mining Journal

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Yuba No. 15 All-Steel Gold Dredge

By Lewis H. Eddy*

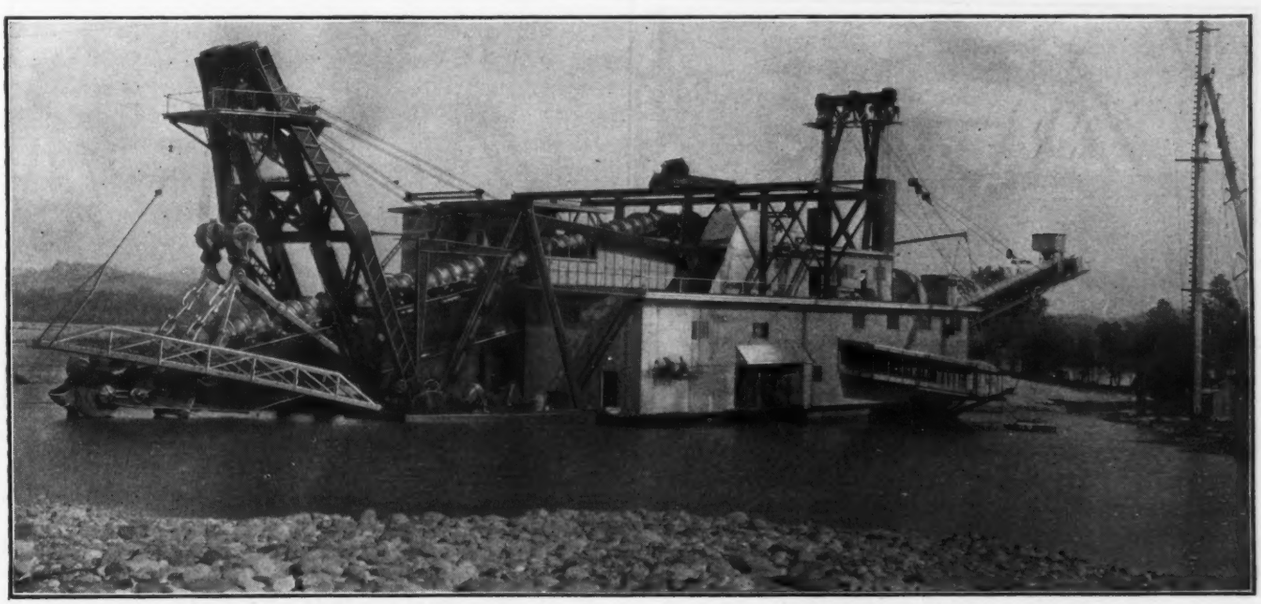
SYNOPSIS—This new 17-cu.ft. dredge started digging at Hammonton in the Yuba Basin field, California, on July 3, 1916. It is said to be the largest all-steel placer dredge ever constructed. It was built by the Yuba Construction Co. for the Yuba Consolidated Gold Fields and weighs over 2,900 tons.

Yuba No. 15 bucket-elevator dredge of 17-cu.ft. bucket capacity, the largest all-steel placer dredge in the world, started digging on July 3, 1916. It is the eighth all-steel placer dredge built in California by the Yuba Construction Co., of Marysville, and the fourth all-steel dredge installed by Yuba Consolidated Gold Fields at Hammonton, in Yuba Basin district, Yuba County.

Construction of No. 15 was begun with actual laying of steel on Feb. 3, 1916; it was ready to launch on Mar. 15, taking off four rainy days. But launching was postponed until Mar. 26 on account of warm weather melting the snow in the foothills and some of the higher mountains, causing a rise in the Yuba River that backed the water up under the hull and prevented the removal of foundation posts and placing of the ways.

Immediately upon completion of No. 15, preparations were made for construction of Yuba No. 16 on the same ways. No. 16 will be of the same bucket and yardage capacity and of the same design as No. 15, except that it will be equipped with two tailing stackers for reclamation of Yuba River channel.

In designing Yuba No. 15 it was evidently the purpose to make the boat similar in most details to No. 14[1], if not patterning after that boat precisely; but in all dredge construction there is a growing demand for improvement in recovery and saving in operating expenses, so that when the construction of No. 15 was settled upon and the dredge stood ready for active digging, there was sufficient difference and improvement to identify it as unique in gold-dredge construction. The one feature of change most noticeable is cutting off the corners of the stern, as shown in an accompanying illustration. This allows the dredge to be more easily turned and is especially adapted to this field.



YUBA'S NEW ALL-STEEL DREDGE NOW OPERATING NEAR HAMMONTON, CALIF.

The hull dimensions are 165 ft. long; 68 ft. beam, with no overhang, and 11 ft. 6 in. deep. The hull is 10 ft. longer and wider than in Yuba No. 14. The well-hole is 8 ft. 3½ in. wide in the clear, and the well-hole pontons each 20 ft. wide at the bow. The width of the well-hole is the same as in Yuba No. 14, but the pontons of No. 15

*Associate Editor, San Francisco, Calif.

[1]"Eng. and Min. Journ.," Mar. 28, Apr. 4 and 11, 1914.

are 5 ft. wider. The total weight of the hull is 1,700,000 lb. The completed dredge weighs more than 2,900 tons, which is about 900 tons heavier than No. 14.

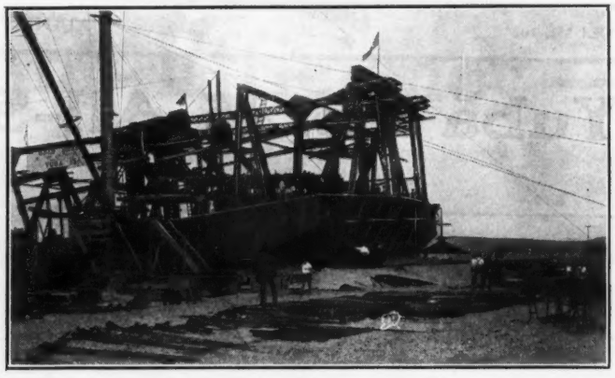
Most of the important parts of No. 15 are of greater weight than those of No. 14. The total weight of the bucket line, composed of 100 buckets, is 488,234 lb.; the buckets weigh 4,440 lb. each, the pins 430 lb. each, and the total weight of the digging ladder equipped is 868,454 lb. The bucket idler weighs 26,000 lb. The weight of the revolving screen is 135,000 lb. The bow gantry weighs 50 tons and the stern gantry 15 tons, or a total of 130,000 lb. The ladder suspension is much heavier than in No. 14. The suspension tackles weigh 13 tons each; the lower tackle blocks, 7¼ tons each.

The spuds weigh 45 tons each, or a total of 180,000 lb. They are each 10,000 lb. heavier than the spuds of No. 14, owing to their greater length. The upper tumbler weighs 41,000 lb. and the lower one 22,000 lb.; this total of 63,000 lb. is 7,000 lb. heavier than the total of No. 14 tumblers.

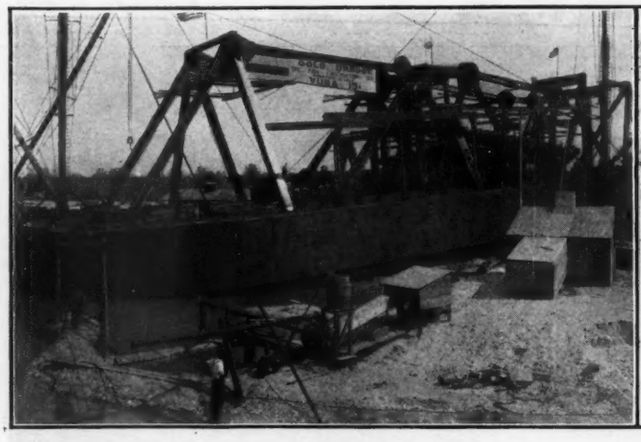
The dredge is designed to dig 82 ft. below the water line, with a yardage capacity of over 300,000 cu.yd. of material a month. The digging ladder is 154 ft. long, built in six sections, the heaviest section weighing 64,100 lb. The tailing stacker is 175 ft. long, provided with a 42-in. conveyor belt, 283 ft. long. The stacker drive is the common drive on the outer end of the stacker. The digging ladder of No. 14 is 20 ft. shorter than the one on No. 15, and the tailing stacker 39 ft. shorter. The upper tumbler is six-sided, of the same type as No. 14, but the lower tumbler is of the round type, while the lower tumbler of No. 14 is hexagonal. The ladder-hoist winch is larger and heavier than in No. 14, to take care of extra length of ladder and extra weight of bucket line. The swing winch is of the same design as for No. 14. The entire dredge is operated from the winch room. The bucket idler is cast in one piece, 9-ft. 5¾-in. diameter, 1-ft. 11 $\frac{3}{16}$-in. radius; the rim is 14 in. wide; shaft 11 ft. 1 in. long, 9½-in. diameter. This is practically the same as the idler of No. 14.

The revolving screen is the same as on No. 14, except that it is assembled with bolts throughout, and all wearing bars are of manganese steel. It is provided with water nozzles in each end for washing and separating the gravel passing through. The spuds are 70 ft. long and 5 ft. by 3 ft. 1 in. in section; the points are 10 ft. long each. These spuds are 8 ft. longer than those of No. 14 and proportionately larger in section. They are built of steel plates and angles. The pumps are the same as used on No. 14.

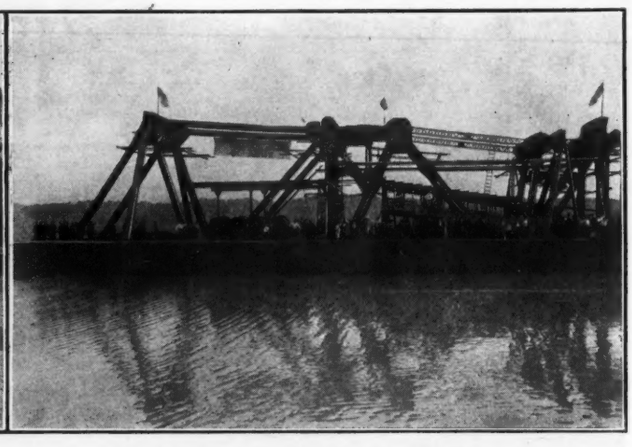
The 12 electric motors are of General Electric make. They are as follows: Main drive and ladder hoist, 500 hp.; swing winch, 35; 14-in. high pressure pump, 150; 14-in. low pressure pump, 75; 6-in. 2-stage pump, 50; two 6-in. vertical pumps, 20; 4-in. priming pump, 15; stacker drive, 75; screen drive, 75; stacker hoists, 10; tool drive, 2; total, 1,007 hp.



VIEW OF YUBA NO. 15, SHOWING CUT CORNERS AT STERN—A NEW FEATURE



YUBA NO. 15 ON THE WAYS—BOW END



YUBA NO. 15 AFTER LAUNCHING

The main house is framed of 5-in. 6½-lb. channel posts, plates and girts, with 8-in. 11½-lb. channels for rafters. The frame is inclosed with two thicknesses of No. 22 sheet steel, between which is a sheet of $\frac{3}{16}$-in. paper board, all riveted together. Each sheet is connected at the post to the butt strap of 3½x⅛-in. steel, fastened to the post with ⅜-in. round-headed bolts. The roof is of wood, 1¼-in. tongued-and-grooved Oregon pine, covered with No. 10 canvas painted with two coats of Prince's Metallic. The screenhouse and winch-house are of the same construction.

The entire inside and outside of the hull, including the hull trusses and gantries, were sand-blasted to remove mill scale and thoroughly cleaned before painting. The outside of the hull is covered with three coats of paint. The inside of the hull is painted with two coats; the inside bottom and the sides for 2 ft. are covered with "bitumastic enamel."

Grades and Uses of Spelter*

Spelter, like all commercial metal, contains impurities, but, unlike most other metals, none of these impurities are advantageous for any of the purposes for which it is used. The effects of these impurities on different products made from it vary greatly, hence the necessity for several grades differing in purity. Spelter is used for the following purposes, in quantities in the order mentioned: Galvanizing, alloys, rolling, ornamental castings and miscellaneous uses.

For ordinary galvanizing the effect of the common impurities is not very great. Iron is objectionable as causing a loss in dross and in making the coating more brittle and liable to crack and peel off. Lead, up to the limit found in commercial spelter, has no serious effect, but is objectionable when present in large quantity, as it liquates in the bath and does not enter the coating and is therefore wasted. Lead is usually worth less than zinc, and the purchaser does not wish to pay for it at zinc prices.

The four higher grades of spelter are chiefly used for alloys, and the specifications were principally made for the alloy makers and do not, in all cases, call for metal suitable for some of the other purposes for which it is used.

Aluminum Excluded from High Grades

In alloys, aluminum is frequently very injurious, 0.01% in many cases making brass useless for the purposes for which it is intended. In the few instances where its presence is desired, it is more satisfactory to add it directly than as a constituent of the spelter. The specifications (as proposed for the American Society for Testing Materials in 1915), therefore, require that the four higher grades of spelter shall be entirely free from aluminum.

Iron is always present in spelter, but is very undesirable in brass and similar alloys, making them harder and greatly increasing the hardness due to cold working. The increased hardness is very objectionable, causing a greater consumption of power and endangering the rolling mills and drawing presses.

Lead the Main Variable in Spelter Grades

Lead is very objectionable in some alloys and essential in others, and the main variation in the different grades of spelter is in the allowable amount of lead. High-grade spelter, which is used for alloys that are to be subjected to the most severe spinning and drawing operations, can be rejected if it contains over 0.07% of lead, as lead reduces the ductility of brass.

Intermediate spelter, with a lead limit of 0.20%, is used for alloys that do not have to undergo as severe treatment, and also very largely for alloys like manganese bronze that are used both cast and wrought.

Brass special has a lead limit of 0.60% and is mainly used for brasses where the maximum ductility is not required. The lead and iron are limited to 0.60% and 0.03% respectively, because brass made from such spelter is used for ordinary drawing, spinning and forming work where the requirements are not especially severe.

Selected spelter carrying the maximum 0.80% of lead and 0.04% iron is used by brass manufacturers for making alloys to which lead is added in order to secure free-cutting qualities. Material of this kind is usually made into rods and heavy sheets for the manufacturing of small articles by turning, milling and drilling operations. Such brass must contain sufficient lead to reduce the strength of the material and cause the chips to break easily.

Owing to the fact that brass is usually made in crucibles in small quantities, uniformity in the spelter is of the greatest importance. As lead segregates badly, and more markedly the higher the proportion, the lead limit of the average sample is made low enough to allow for this tendency without injurious effect on the product. Even when the brass manufacturer adds lead, he does so in known amounts and thus obtains a uniform alloy from the different pots, which would not be possible if all the lead needed were contained in the spelter.

Cadmium Intensifies the Effect of Lead

There is very little doubt that cadmium in zinc is very injurious for some of the purposes for which it is used, as it renders it harder and much more brittle. There is, however, considerable difference of opinion as to how far these undesirable properties persist in alloys made from zinc containing cadmium. The majority of the brass makers are of the opinion that the high temperature of the brass pots causes so much of the cadmium to volatilize that the residual amount has very little deleterious effect.

There is no doubt that large amounts of cadmium, say 1 or 2%, make brass hard and brittle. We have no reliable information at present showing the effect of small amounts of cadmium on the alloys, and the evidence on this point is extremely conflicting.

Cadmium, together with lead, seems to intensify the effect of the latter and also causes the brass to become more sensitive to the effect of overheating in the various annealing operations to which the wrought material is subjected.

Very little spelter is made containing as much cadmium as is allowed for intermediate and brass special, and the specifications, therefore, put practically no limit on cadmium except for high grade. Whatever the facts may be for alloys, it is certain that the amounts of cadmium allowed by the specifications are much greater than are permissible for other purposes for which zinc is used. The question of cadmium in the better grades is complicated by the fact that until the last year and a half practically all the high-grade and most of the intermediate spelter was made by one company from ores that are free from cadmium. The alloy makers have therefore had no extended experience with the effect of cadmium in the better grades of spelter, and during the last 18 months conditions have been so abnormal that it is difficult to draw conclusions.

High-Grade Spelter Used for Galvanizing

High-grade spelter is very extensively used for galvanizing telegraph and telephone wires, which are required to stand sharp bending when making the "lineman's splice" as it has been found that if impure spelter is used, the coating cracks and peels off the joint. The only high-grade spelter that has been used for this pur-

*By G. C. Stone, W. H. Bassett and M. N. Price, submitted as an addendum to the report of the Committee on Nonferrous Metals and Alloys at the meeting of the American Society for Testing Materials, Atlantic City, N. J.

pose is entirely free from cadmium. Cadmium being the element most likely to cause this trouble, it is very doubtful whether metal containing as much as is allowed by the specifications (0.05%) would be suitable for this purpose.

For rolling, cadmium causes such severe cracking that metal containing much of it is not economical; but as practically all the zinc rolling mills produce their own spelter, this matter is within their own control and the specifications do not affect them.

For ornamental castings no spelter described by the specifications would be satisfactory. The high-grade is all right as far as lead and iron are concerned, but with the maximum cadmium allowed, it would be impossible to make castings of many of the common shapes.

Manitoba Gold-Belt Prospects

In his report to the Public Utilities Commission of Manitoba, Professor R. C. Wallace of the University of Manitoba, recently returned from an examination of the Rice Lake gold district, says in substance:

The original discovery was made at Rice Lake, which has consequently given its name to the whole district. There are four areas in all, however, which are attracting considerable attention—Rice Lake, Gold Lake and vicinity, Long Lake and Halfway Lake, and a belt north of the Hole River. These areas are situated approximately in one belt having a general northwesterly and southeasterly trend. The belt is 10 mi. wide and 40 mi. long, its northwestern end being 16 mi. east of Lake Winnipeg.

During the summer months, access to the camp is obtained over the Bad Throat or Hole Rivers, which are reached by boat from Selkirk. During the past three years the Bad Throat River has been used almost exclusively. On this river the portages are numerous, and with heavily laden canoes a journey of two or three days is necessary to reach the camps. In winter, provisions and machinery are hauled across Lake Winnipeg from Riverton to the mouth of the Bad Throat River and thence by winter road to the camps.

The mining district is situated in a comparatively narrow belt of sediments, greenstone and porphyry, which follows the trend of the Bad Throat and Hole Rivers and is bounded on the north and south sides by granite. Of chief importance is the fact that a central body of granite between Gold Lake and Long Lake has intruded all these formations, sending out quartz veins into porphyry and greenstone and itself showing quartz veins of the same age. It is a feature of special interest that quartz veins in this granite more than a mile from a contact show promising gold veins on the surface. The veins follow almost without exception the trend of the inclosing rock.

In the originally developed district around Rice Lake, the veins were prospected in porphyry and sediments. In the Gold Lake district they occur almost entirely in porphyry, while near Long Lake they were originally followed in porphyry, but later in granite and in diabase.

The character of the veins varies only very slightly with the variation of country rock. They follow well-defined fissures in shear zones and may be traced not infrequently for a mile. As a rule they are narrow, and the few wide lodes that occur carry low values, if any. This feature renders necessary the continuation of good assays to a considerable depth before success can be assured. The veins are well mineralized with sulphides of iron and copper, and to a minor extent with sulphides of lead, zinc, molybdenum and arsenic. The highest surface assays in gold occur where copper sulphides are well distributed in the quartz, as at the Moose mine, and in the granite veins south of Halfway Lake in the Long Lake District. It is improbable that the sulphides of copper will continue in depth, and it is a matter of the first importance to determine whether the gold assays will continue with the iron sulphides at deeper levels. It is encouraging to find that the veins are very well defined, easy to follow and have sharp walls.

The stage of development reached so far is rather immature. Most of the work has been done in the Rice Lake area, where depths of from 50 to 100 ft. were reached and some drifting and crosscutting done. Presumably owing to lack of funds, none of the properties in this section are now being operated, and the original Rice Lake area has been temporarily abandoned for the Gold Lake and Long Lake fields.

In the Gold Lake district the most extensive work has been done on the Moose, Gold Pan, Gold Seal, Pilot and Nevada properties. Of these the Moose alone is now being operated. It is the only property in the entire region in which underground development is now in progress. At the Moose and Gold Pan, depths of over 100 ft. have been reached. Both of these are in porphyry. At the depth attained there is comparatively little change in the width of the quartz veins. The rich showings of the Gold Pan were obtained at a depth of 115 ft. in the vicinity of a heavy diabase dike which intersects the quartz vein. There is no pronounced activity at present, not more than 40 men operating in the whole district.

Real development is seriously hampered owing to lack of transportation facilities. Apart from the high cost of transportation, mine managers find it difficult to obtain good miners under present conditions. Though there is nothing in the development of the camp to justify the building of a railroad, a wagon road is a necessity; and unless one is built, development will be seriously arrested.

The whole country is covered by staking to such an extent that prospectors have to go far afield to discover unclaimed territory. The whole district must be considered as a prospect in the early stages of development. There is nothing as yet to indicate that there will be any very large mines, but several successful ones may develop on a smaller scale. The best opportunities appear to be in the central granite or in the porphyry near the contact with the granite. The quartz veins are somewhat larger in the granite than in the porphyry, but on account of the origin of the gold and associated rock, good assays may be found more persistent with depth in the porphyry.

The Library of Congress has issued, through its card division, Bulletin No. 15, describing its system of publication and sale of cards for Geological Survey and Bureau of Mines publications. These cards are particularly useful for libraries, but also for those engineers who keep elaborate filing systems. These cards are published not only for the publications of the United States Geological Survey and the Bureau of Mines, but also for the various state surveys, including other publications on the geology of states and of foreign surveys and other publications relating to the geology of foreign countries. Copy of this circular can be had by application to the Libary of Congress.

Some Practical Notes on Mine Surveying

By W. F. Boericke*

SYNOPSIS—Practical hints for surveying in flat deposits. The degree of accuracy should be consistent with the importance of the work. An alternative for shaft plumbing is given.

The methods of mine surveying here described have been found especially applicable to the Wisconsin zinc field and should prove useful where mining and geological conditions are similar—that is, where the deposit is horizontal or nearly so and the workings are comparatively shallow, not over 200 ft. deep, and all worked from the same level. The "pitch," or stope workings, may vary from 10 to 60 ft. or more, averaging about 35 ft. The surveyor's work will consist in preparing plan and section maps of the workings at regular intervals, locating drill holes, keeping track of property lines, etc., besides special work on connections, shafts, raises, etc., that may be required from time to time.

Some of the methods outlined may seem crude and insufficiently accurate for an engineer. It must be borne in mind, however, that the degree of accuracy sought must be at all times commensurate with the importance of the work. In the present instance a precision is not looked for greater than 1 in 1,500 for all ordinary work. Unless conditions are exceptional, a greater accuracy would not be justified by the more elaborate methods and longer time necessary to attain it. Surveying is a business proposition in that the expense entailed for it must give adequate results, and a point is soon reached where the cost of a greater precision is not justified by local conditions. In short, the aim of every surveyor should be consistent accuracy.

A Light Transit with Adjustable Legs Used

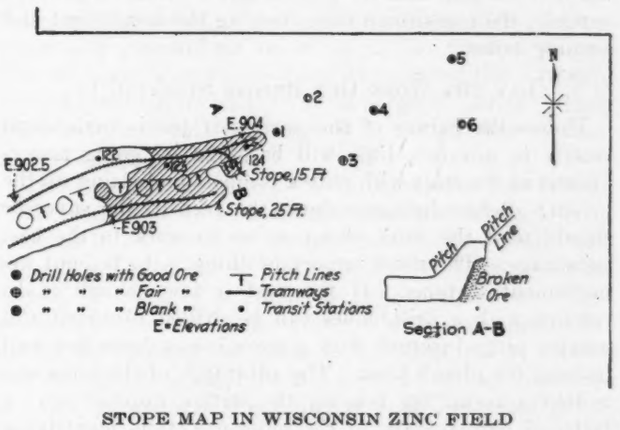
The transit should be light, strong, and keep its adjustments in spite of the rough usage that is inevitable underground. A powerful objective is unnecessary, as there will be few shots underground over 300 ft., and a candle can be easily centered on the ordinary telescope at that distance. It should have the necessary attachments for either the top or side telescope, and this extra piece should always be carried in the transit box for special work in which it is essential. The top of the telescope should be punch-marked for setting up under an overhead station. A full vertical circle is preferable to a half-circle, as it enables the vertical angle to be read when the telescope is plunged.

The tripod should be of the adjustable type, with sliding legs. With such a tripod an experienced man can make a set-up easily and rapidly, in all but impossible places. The plumb-bobs should also be adjustable, having a knurled screw in the head, by which the bob is raised or lowered—a great saving of time.

A 100-ft. steel tape is long enough for all ordinary mine work. A longer tape than this is heavy to handle and is more apt to kink, also is difficult to keep out of the way of shovelers and trammers. If the mine is muddy, it will soon collect enough dirt to make reeling and unreeling impossible without cleaning. Time will be saved in the end by making an extra set-up where shots longer than 100 ft. are necessary. The tape should be marked in plain figures, every foot numbered. The first and last foot should be divided into tenths. In measuring between stations and other important points, the footmark is read by the surveyor's helper, and the tenths and hundreds by the surveyor, the latter being estimated, unless it is preferred to use a flexible steel pocket scale for this.

Tapes should be thoroughly cleaned and dried after each day's work. With careful usage they will last a long time, but when one starts to break it pays to get a new one, as the ordinary repair job will not last long in the rough stopes underground.

For measuring stopes or taking side shots where it is impossible or inconvenient to set up a transit, an instrument of the Brunton type is very valuable. It is essential to pick out a place to work from that is comparatively free from local attraction, proximity to drill columns, machines or cars, making accurate work impossible. To use a Brunton compass quickly and accurately needs considerable practice, but for certain kinds of work it is the best instrument for the job. It is particularly useful in getting the direction of crevices, pitches, etc., that appear in the roof, and in giving approximate lines to work from until a transit survey is possible.



STOPE MAP IN WISCONSIN ZINC FIELD

The modern carbide cap-light is almost a necessity for rapid, accurate angle reading underground. A candle is messy and clumsy to handle, and gives much less light. With the carbide lamp it is possible to read angles to the nearest minute without a reading glass. It is best carried in the cap out of the way, leaving both hands free for other work. The body of the lamp, however, will affect the needle perceptibly, if it is in use, although this can be avoided by proper manipulation. The carbide lamp in the hands of the helper makes a brilliant light behind the plumb-bob string, making a 300-ft. shot entirely possible and rendering it unnecessary for the

*Mining engineer, Galena, Ill.

transitman to bother about the illumination of the string.

A tip in regard to working clothes: Khaki is excellent, but be sure that the coat pockets are big enough. The surveyor must carry several notebooks with him constantly, and his fieldbook must be produced from and returned to his pocket several hundred times a day. Nothing is more ruinous to good temper than a coat pocket into which the notebook refuses to slip easily. The coat lapel should also be provided with a special buttonhole from which to suspend the carbide lamp when it is not on the cap.

The best accessory a surveyor can have in his work is a good helper. If he can get a man who is quick, intelligent and painstaking, who takes an interest in the work and saves a multitude of steps and laborious explanations by doing things without being told, and at a pinch do some checkwork himself, and so eliminate the personal equation, he has, indeed the pearl of great price. But he can't get him. That man has just been promoted to a better job. It is surprising how much more can be done with an efficient helper, aside from the added confidence the surveyor has in the accuracy of the work. Under ordinary conditions one helper is all that is required, but where there are a lot of side shots to be taken, a second man is very useful to handle the tape entirely, the transitman only running the instrument and keeping notes.

Lay the Work Out Before Starting It

Unless the nature of the particular job is understood clearly in advance, time will be saved by going underground at the start with only a compass and sizing up the layout. Before bringing down the transit, the surveyor should plan the work ahead, so as to work to the best advantage. The most important thing is to lay out his permanent stations. If the roof is low enough to be reached with a drill, holes can be drilled overhead and wooden plugs inserted, with a screw-eye or horseshoe nail to hang the plumb from. The advantage of the screw-eye is that a metal tag bearing the station number can be fastened permanently to the screw-eye, thus identifying it. If there is no chance to reach the roof, nails can be driven in the track ties (very unsatisfactory, obviously) or pipes can be driven in the ground. Although it requires more skill in setting up, the overhead plug is the most satisfactory station for underground work. It can be easily found, if properly drilled is rarely lost, and its position can never be changed. To keep it from being shot out, the plug should be driven in about flush with the roof.

In ordinary surveying work the azimuth method, all things considered, is the most satisfactory. The details of this method of running transit lines are so well known as to require no explanation. For station work angles are read to the nearest minute, distances to the nearest hundredth of a foot. Checking is best done by tying-in to a station the coördinates of which have already been established. Side shots and stope measurements are taken rapidly to the nearest half-degree, and the tape read to the nearest half-foot. Where it is possible to use the needle, a single check should be taken before moving the transit to see that there has been no large error in angle.

No set rule can be given for the needle deflection due to setting up over tracks. A good deal depends on the condition of the rails and the direction in which they lie with respect to the meridian. With 16-lb. rails and a 22-in. gage, the maximum deflection of the needle for an H. I. of 4.5 ft. should not exceed 3°. This assumes that the transit is set over the center of the track.

Where a long line is to be run with no turns in it greater than 45° and no necessity for side shots, the double-deflection angle method is very satisfactory and doubtless more accurate than the azimuth method. It is more complicated than the latter, and results are not arrived at so quickly. Two back sights and two foresights are required, and this of course means more time. Its great advantage is that there is a perfect check at all times on the angle work, and instrumental errors due to poor adjustment of the collimation line are eliminated by taking reversed readings.

Underground Leveling More Accurate Than Surface

Levels are run underground in the same manner as on the surface, and the work can be done with more accuracy, on account of perfect atmospheric conditions. The rodman should use a carbide light and a self-reader rod, by which readings can be taken easily to the nearest 0.01 ft. for a distance of 100 ft. Bench-marks may be either permanent frogs, etc., on the track, or the overhead plugs used for transit stations.

The best advice that can be given for surveying is not to waste time in nonessentials. Know what you have to do before starting work. Determine the degree of accuracy you will hold in the work, then work consistently toward that precision. If you are satisfied with a precision of 1 in 1,000, don't waste time in centering to 0.01 in. It is entirely inconsistent to read angles to the nearest 30″ and tape lengths to 0.1 ft. Conversely, if the work is sufficiently important to justify a precision of 1 in 10,000, go to the other extreme and neglect nothing that can affect the accuracy of the work. Particular care should be used in taping, and have only experienced, careful men, who realize that the job means more than getting in an easy shift. It will be of no avail to blame it on the helper when the raise misses the shaft by a foot. The surveyor alone is strictly responsible for the work.

One of the great advantages of the azimuth method is the ease with which transit notes are made available for the office and drawing room. The conversion of azimuth into bearing will become mere routine with a little practice. For calculating latitudes and departures, coördinates, etc., a book of tables is essential for saving time. The coördinates of all permanent stations should be checked at once, by a graphical method. The side shots can then be entered on the map with protractor and scale.

Though a scale of 1 in. to 50 ft. is commonly recognized as standard, it is hard to see where it has any particular advantage. One to 40 is a great deal handier for the mine foreman, who usually has nothing but a broken foot-rule to scale with and whose knowledge of fractions is sometimes hazy. Of course, the larger the scale the more detail can be shown from a survey and the closer it pays to take side shots. On the other hand, if the map must be drawn to a scale of 1 in. to 100 ft., or smaller, it is a waste of time to take a lot of side shots, as they cannot be shown in fine enough detail. Here again the transitman must be consistent in his work.

Surveys are brought up to date every two or three months, and the new ground cut is indicated by hatching, as shown in Fig. 1. Elevations, permanent transit stations, property lines, drill holes, tramways, pitches and crevices are all indicated on the completed map. Smaller maps of the headings that may be of assistance to the shiftbosses are also furnished. Section maps, when required by a change in the height of stope, are taken at right angles to the pitch, at intervals of 100 ft., as shown in Fig. 2.

Two-Shaft Method of Plumbing Used When Possible

For carrying the azimuth underground, where there is no incline, the two-shaft method, in which a wire is suspended in each shaft and a traverse run below and on top between the two, is the quickest and most satisfactory. If there is but one shaft, however, recourse must be had to the top or side telescope, or else the shaft plumbed in the time-honored-method with two wires. Where the shaft is only 5x9 ft. in the clear, giving a base line not over 8 ft. and frequently less than that on account of pumps, wires, ladders, etc., the practical difficulties encountered may cause considerable inaccuracy particularly if the shaft is wet and air currents are troublesome. If only a general map is wanted, a temporary azimuth will serve in many instances. In such a case the azimuth is obtained from the needle by setting up in a drift at a point *A* entirely free from local attraction and obtaining the bearing of the line *AB*. The transit is next set up at *B*, and if there is no local attraction, the bearing should be the same plus 180°. From this point a traverse is run to the shaft, using the azimuth so determined and neglecting the needle. Here a sight is taken on a wire the surface coördinates of which are known. This will locate the points *A* and *B* with respect to the surface stations. If the needle is sensitive and the work is done carefully, this temporary azimuth will not differ more than 1° from the true azimuth and may often be much closer than this. In two cases under my direction the difference between the temporary and true azimuth was 17′ in one and in the other 22′.

It is better to use this method than to survey between two drill holes, below and on top, and calculate the azimuth therefrom. Churn-drill holes sometimes go down surprisingly straight, but the majority are off anywhere from 6 in. to as much as 5 ft. in 100 ft. depth. It is unwise to check the accuracy of a survey on the coördinates of a drill hole. However, a constant seeming tendency of the drill holes to slide to the south, say, would throw suspicion on the survey. In 7 drill holes, located within a radius of 200 ft., 2 were apparently vertical and all the others varied from 1 to 5 ft., but none in the same direction.

Mineral Output of New York

The mineral production of New York in 1915 is given as follows by David H. Newland, assistant state geologist: Cement, portland and natural, 5,443,024 bbl.; salt, 11,095,301 bbl.; iron ore, 944,403 long tons; natural gas, 7,110,040,000 cu.ft.; petroleum, 928,540 bbl.; gypsum, 516,002 short tons; mineral waters, 8,636,920 gal.; talc, 65,914 short tons; pyrite, 57,241 long tons; graphite, 2,500,000 lb.; garnet, 3,900 short tons; feldspar and quartz, 22,196 short tons; metallic paint, 4,925 short tons; emery, 3,895 short tons; and crude clay, 13,745 short tons. Other mineral substances, including slate pigment, granite, limestone, marble, etc., to the value of $5,648,075 were also produced.

The most interesting item in the year's developments was the entrance of the Northern Ore Co. in the list of producers, this company making shipments of several thousand tons of zinc concentrates, the first that have been made in the state.

Iron ore showed an increase of 192,687 long tons, but was 373,496 tons short of the 1913 production. Other changes were not marked, with the exception of a decline of 456,780 bbl. of cement.

The Occurrence of Germanium in Zinc Materials*

In a recent issue of the *Journ. Ind. and Eng. Chem.*, W. F. Hillebrand and J. A. Scherrer contribute a short article on "The Recovery of Gallium from Spelter in the United States." In addition to the observations on gallium, mention is made of the fact that Dr. K. Burns, of the Bureau of Standards, has examined spectroscopically several samples of zinc ore from various sources, and has identified in several of them, notably in a Missouri sulphide, the very rare element germanium. These observations concerning germanium are of particular interest to us since in recent work we also have encountered this element in a byproduct derived from Wisconsin blende. The exact nature of this byproduct it is not possible to disclose at present.

The occurrence of germanium in blendes has been noted by Urbain, who by spectroscopic methods detected germanium in 38 out of 84 blendes from various localities. From 550 kg. of one of the richest of these, a Mexican blende, he obtained 5 grams of pure germanium. The amounts of the element found have always been small, the aid of the spectroscope being usually required to establish the identification. In the material at our disposal, however, germanium was found in sufficient quantity to be readily detected by the ordinary chemical reagents.

A roughly quantitative determination of the amount of germanium present in the material was carried out as follows: After distillation with hydrochloric acid and chlorine the sulphide was precipitated from the distillate with hydrogen sulphide. In some experiments the sulphide was weighed directly; in others it was transformed into oxide with nitric acid and weighed as GeO_2. The mean of several closely agreeing determinations gave the value of $GeO_2 = 0.25\%$.

To show whether germanium could be found in other zinc ores, samples of similar byproducts from different ores were distilled with hydrochloric acid and chlorine. The distillates, after dilution, were treated with hydrogen sulphide. If no precipitate was obtained, the test was considered negative. If a precipitate was obtained (other than the turbidity of sulphur), it was filtered off and transformed to oxide with nitric acid. The final test consisted in the formation from the residue of the double potassium fluoride with hydrofluoric acid and potassium chloride.

*Excerpt from an article by G. H. Buchanan, in the July, 1916, issue of the "Journ. Ind. and Eng. Chem."

From several of the materials very definite confirmatory tests were obtained; others gave satisfactory blanks, while in only a few instances were the results uncertain. In none of the cases where positive results were secured was there found an amount of germanium at all comparable to that found in the material first examined, probably not one-tenth as much. A positive test was secured from Joplin ore and also from some Mexican ores. The Franklin ores gave negative results.

Mining in China

SPECIAL CORRESPONDENCE

I noticed with interest a reference in the *Journal* last year to an extensive plan of prospecting, under the heading "Mining in China." I am well acquainted with some of the Chinese engineers who have been engaged to coöperate in the prospecting of some of the provinces, but I am waiting to be shown how much real information will be gathered in this way.

I agree with the minister of Agriculture that parts of China are rich in mineral resources, but from my personal observations in West China I am convinced that there are enough known occurrences at least to start a respectable mining industry, if conditions for their development were satisfactory. In the last few years the government has brought forward many plans for developing the mineral resources of China, but it does not seem to have hit on a satisfactory formula yet. There are many conditions that have combined to discourage mining in West China, among which are the following facts: When the Chinese settled this part of China, they gradually pushed the aborigines back into the mountainous parts, where it was impossible for the Chinaman to grow his greatest necessity —rice—and here the aborigines still live in a more or less independent condition. The sovereignty of China is more nominal than real, and in many parts it is very unhealthful for a Chinaman even to travel. In a great many cases these aborigines have either prevented any mining at all or agreed to it only on condition that they coöperate with the Chinese, but retain the controlling interest, which the Chinese almost without exception refuse, although it is the same proposal they offer to foreign capital.

The cost of transportation under conditions existing at present is a serious handicap to anything but a very high-grade deposit in most parts of the province. There is a lack of mutual confidence among the Chinese which makes it impossible to organize anything but a one-man company, which generally has not enough capital available.

ATTITUDE OF THE GOVERNMENT

The attitude of the government in making a government monopoly of many minerals is an obstacle, as also are the unsatisfactory mining laws, or more correctly the unsatisfactory way in which they are administered by the local officials, so that there is no incentive to work the known deposits, let alone search for new ones.

Take, for example, spelter, which reached unheard-of prices last summer. The Chinese producers had a big advantage over any others in that they could increase their capacity very quickly and cheaply. Given mud and a few laborers, the simple Chinese furnaces can be built and made ready to begin operation in from 10 days to two weeks. And yet last summer (1915) when I had an opportunity to visit many of the zinc districts of Yunnan and Szechwan, I found no special activities. In fact, at several places they were not working at all, and at one of them the owner offered to give me the mine if I would work it and give him a good job. At other places they were talking of suspending work. At first I thought they did not know the market value of spelter. On inquiring, I found that they did know, but were not getting the benefit of it. At one place in southern Szechwan the smelters told me that they had to sell all their spelter to a government company at Tls. 3.5 per picul or be liable to a heavy fine and have their smeltery seized. Out of this the smelter has to buy his ore and make what profit he can, which cannot be very much, as it requires four men to operate a furnace of one-picul capacity. This spelter was all being sent to Yunnan-fu, where the price then was Tls. 28 per picul, and freight by pack mule could not be over Tls. 5 per picul. I asked what they had received for their spelter last year (1914), and they said Tls. 3.2, or an increase of a little under 10% when the price of spelter had more than doubled.

THE PROSPECTOR'S COURSE

In several very good editorials the *Journal* pointed out to the zinc miners that the high prices were not due to any lack of zinc ores, but were really a premium on smelting capacity; but in this case the premium appears to be on the discouragement of mining development. I never saw any American prospector, at least when he was sober, give away any information about a new find until he had it recorded and was sure his interests were safe; and as far as I have seen, human nature is the same in China as it is in America or any place else. Therefore I do not anticipate any great rush to inform the local magistrates of any occurrences not already well known to the government.

The central government may be sincere enough in its desire to promote and protect the mining industry; but as long as the local officials can turn an office for collecting royalties into a company with the sole right to buy all ores and metal at its own price, it does not matter much how good the mining laws may be. I simply took zinc for an example, for practically all mining I have seen in West China, with the exception of coal mining, has been throttled by the local officials in some way or another.

[Our correspondent's note respecting the production of spelter in China is of peculiar interest. There is every reason to believe that Europe obtained its first knowledge of zinc smelting from China and that the art is practiced now in China probably in the same way as it was two centuries ago. With respect to the antiquity of zinc smelting in China the following note from the *Journal* of the Royal Society of Arts, June 23, 1916, is of interest.—Editor.]

From 1893 to 1900, specimens of Chinese zinc were examined and found to be of uniform appearance. From inquiry the samples were said to have been taken from slabs, sometimes spoken of as "Ming" zinc. One such slab submitted to me weighed one picul (133⅓ lb.) and bore a date in deep well-molded Chinese characters corresponding to 1585 A.D. The Ming dynasty extended from 1368 to 1644 A.D. It was stated that although they were found to contain no silver, the slabs had at one time been used as coins.

There was much rumor as to the place of storage of these ingots. It was gathered that a large number were

hidden in a hill near Lien Chow in the northern part of the Kwantung province, also that the natives in the vicinity were much opposed to any sale or removal, on account of the Fung Shui—the superstition which regards with extreme disfavor any interference with the soil. However, it is probable that difficulties were overcome, as after about 1900 no more was heard of this particular brand of Chinese zinc. All samples contained over 98% of metal, with very small quantities of iron and lead. Modern Chinese zinc is of about the same standard of purity.

The ore is said to be abundant in Hunan, Hupeh, Kweichow and Yunnan, and in this last district to be extensively smelted.

FRANK BROWNE,
Formerly Government Analyst, Hong-Kong.

The 2,000-Ton Leaching Plant at Anaconda*

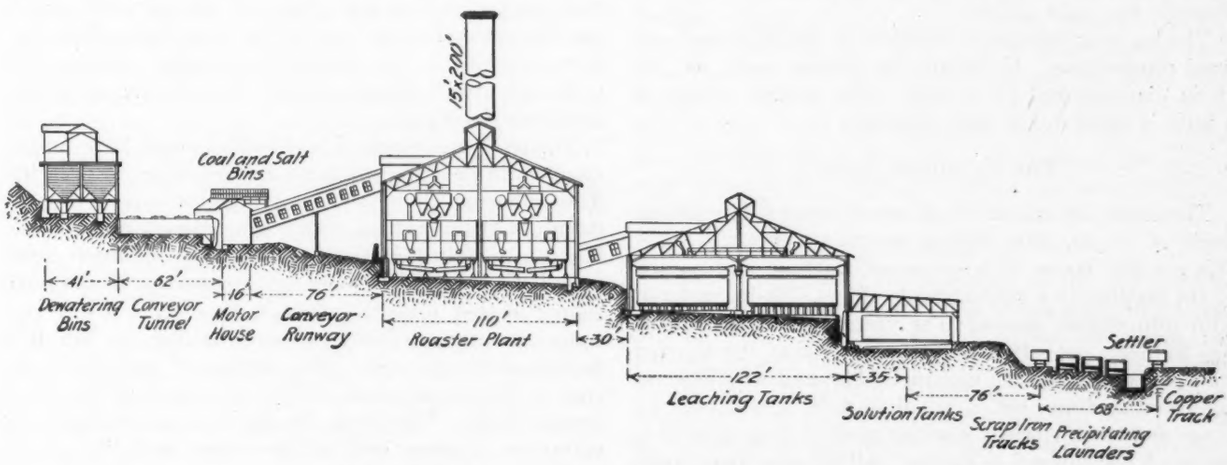
After a series of experiments covering a period of about three years, a 2,000-ton leaching plant for the treatment of the accumulated copper-concentrator tailings was built and put into operation in May, 1915, at Anaconda, Mont. The accumulated tailings in the New Works dump is estimated at about 20,000,000 tons, of which the following shows an average screen analysis: +20-mesh, 22.6%; +40-mesh, 64.7%; +60-mesh, 82%; +80-mesh, 89.1%; +100-mesh, 93.8%; +160-mesh, 97.7%; +200-mesh, 98.5%; —200-mesh, 0.5%. An average analysis of the tailings being treated at present follows: H_2O, 5.63%; Cu, 0.573%; Ag, 0.487 oz. per ton; SiO_2, 81.0%; FeO, 28%; S, 1.9%; Al_2O_3, 9.8%; and CaO, 0.4%.

The dump is being excavated by an electric hoist equipped with a 4-yd. bucket. The hoist loads the tailings into 50-ton ore cars. These are hauled to the leaching-plant storage bins in trains of 15 cars each. The hoist is capable of hauling 3,000 tons in 8 hr.

The loaded cars of tailings are spotted by means of a 25-ton electric locomotive operated by the third-rail system. The unloading pit is a steel bin capable of holding 350 tons and is long enough for three cars to be unloaded at a time. On top of the pit is a 2-in. grizzly, through which all tailings must pass before going to the storage bins. This grizzly serves to keep out rocks or lumps that would block the feeders, furnaces, etc. Under the steel bin are 22 short-belt feeders, each feeding from its own gate and running at right angles to the length of the bin. These feeders discharge onto a 36-in. belt running lengthwise, which in turn delivers the sand to another 36-in. belt traveling on an 18° angle to the top of the storage bins. The system will handle over 3,000 tons in 8 hr.

The storage bins will hold 6,000 tons of sand tailings. This gives between two and three days' supply for the leaching plant, in case of railroad troubles or difficulties due to cold weather. The bins are of substantial wood construction and are inclosed, the walls and roof of the building consisting of wood sheathing covered with corrugated iron. The bins are arranged in a double row and are hopper-bottomed. The tailings are distributed over the bins by means of a 36-in. belt and movable tripper. Underneath are 36 gates, each with its hopper from which an 18-in. belt feeder delivers to a 24-in. belt running the full length of the building, in the center. By means of other belts, traveling through a tunnel under the railroad tracks and up an 18° incline, the feed is delivered to the top of the furnace building.

There are also small coal and salt storage bins from which a 22-in. belt system conveys coal and salt to bins in the roaster building, the salt being drawn from there to the leaching building as it is required. All belts run at approximately 400 ft. per min.



CROSS-SECTION THROUGH ROASTING AND LEACHING PLANT

The furnace building is 232x110 ft. and is of steel and concrete construction. There are 28 MacDougall-type six-hearth furnaces arranged in four rows of seven each. The furnaces are 20 ft. in diameter, each being equipped with two fireboxes, diametrically opposite, the flame entering over a fire bridge directly into the third hearth, the top hearth being designated as the first. The grate dimensions of each firebox are 3x4 ft. Each furnace has a 20-ton feed hopper, to which the tailings are delivered by means of two 24-in. belts each equipped with a movable tripper. The furnaces are fed by 14-in. belt feeders drawing from these hoppers, the amount of feed being controlled by gates operated by means of a screw adjustment, the feed dropping through a hole in the top arch, directly onto the top floor. During the time the feed is on the two upper floors, it is dried and heated; as it drops to the third or fired floor,

*Excerpt from an article by Frederick Laist, metallurgical manager, and Harold W. Aldrich, leaching plant superintendent, to be read at the Arizona meeting of the A. I. M. E., September, 1916.

the sulphur ignites. The three lower floors are kept hot by the combustion of the sulphur in the tailings.

Four flues run the length of the building, one over each row of seven furnaces. Each furnace has two opposite connections, from the top hearth to the flue. All four flues lead into a balloon flue with a downtake of 45°. The balloon flue enters the 15x200-ft. steel stack with a 45° uptake. The stack is unlined. In the bottom of the balloon flue is a 6-in. screw conveyor which delivers the flue dust to the belt-conveyor system that receives the calcine from the furnaces.

The furnaces are air-cooled, air being furnished by four No. 11 Buffalo blowers each direct-connected to a 50-hp. motor. The air intake is at the top of the furnace shaft and the discharge at the bottom. The hot air does not enter the furnaces, but is delivered to the leaching and solution buildings for heating purposes by a suitable piping system. When it is not needed for this, it is discharged into the atmosphere.

Each furnace is equipped with a cylindrical cooler, 30 in. in diameter and 19 ft. long. The cooled calcine enters a mixer or concrete-lined steel cylinder, at the head end of which a very small stream of water is added to settle the dust. The mixer discharges a moist warm calcine to an 18-in. conveyor belt, and by a system of conveyors the calcine is delivered to the leaching building. The ashes from the fireboxes drop into launders and are sluiced out through the main tailrace.

The leaching building is 293x122 ft. and is of steel and wood construction. It contains 10 redwood tanks each 50 ft. in diameter and 14 ft. deep. The average charge to a tank is about 1,000 tons of calcine.

The Leaching Tanks

The tanks are equipped with an ordinary filter bottom, made of 1¼-in. slats resting on 2x4-in. pieces. Above this are two layers of heavy cocoa matting, and on top of the matting is a grating made of 1¾x3½-in. material with 6-in. square spaces. The grating fills with calcine 3½ in. deep and serves to keep the force of the sluicing water from tearing the matting. The acid solutions rot the cocoa matting, but if not disturbed, it will hold its shape and be an efficient filtering medium long after it is too much decomposed to handle. All the steel tank hoops are covered with lead pipes to protect them against leaks of acid solutions. The tanks are in two rows of five each. A 20-in. conveyor belt travels over each row, and by means of a tripper the calcine is dumped into a suitable distributor, which spreads it over the tank.

Each tank has three lead pipes 4 in. in diameter and one 4-in. iron pipe entering at the top. The lead connections are for strong and dilute acid solutions and the iron pipe is for wash water. Above the level of the leaching tanks an iron storage tank is provided for holding the stock of concentrated acid. Its capacity is about 120 tons of 60° Bé acid. All concentrated acid, used to raise the acid strength of any solution, is added to the solution as it goes on the charge in the leaching tanks.

There are seven 10-in. sluicing gates in the bottom of each leaching tank, one in the center and six spaced equidistant from each other in a circle about halfway between the center and the circumference of the tank. These discharge into launders that connect with the main tailings launder. "Acimet" valves and lead piping are used throughout for handling dilute and concentrated acid solutions. The floors of both the leaching and solution buildings are of concrete and are painted with an asphalt-tar mixture for acid proofing. These floors slope to a gutter that connects to a sump and in this way any overflow or leakage of solution is saved and returned to the system by a pump.

The solution-tank building is a lean-to off the leaching building and contains five solution-storage tanks. These are 50 ft. in diameter and 14 ft. deep. Solutions drain from the leaching tanks to the storage tanks and are pumped to the top of the leaching tanks, from the solution tanks, by means of vertical-shaft direct-connected hard-lead centrifugal pumps.

The precipitation of the copper and silver is accomplished with scrap iron. The precipitating launders are of concrete, each about 250 ft. long and having a section of 4x8 ft. available for containing iron. Each launder is partitioned off into four sections by concrete walls. Any of the 12 sections may be bypassed for the purpose of cleaning up. In the bottom of the launders is a heavy wood grating, upon which the iron rests, leaving a space about 6 in. under it, for accumulation of any cement copper which may drop off the iron. In the side of each section at the bottom are four 6-in. holes toward which the concrete bottom slopes. These holes discharge into launders which carry the copper to a settling tank. There it is washed and stored and finally excavated with a clam-shell bucket, loaded into standard railroad cars and, at present, shipped to the briquetting plant before blast-furnace treatment. An electrically operated Brown hoist equipped with a lifting magnet handles the scrap iron and loads the copper.

The resulting cement copper carries about 70% copper, from which the silver present is recovered by precipitation. The following data are taken from the reports for the month of October, 1915, which is a representative month, but it is certain that the results will be improved upon, after longer operation: Sand tailings treated, 70,401 tons; copper in feed, 0.575%; silver in feed, per ton, 0.45 oz.; copper in tailing, 0.082%; silver in tailing, per ton, 0.14 oz.; sulphuric acid (60° Bé.), per ton of feed, 64.90 lb.; coal, 3.30% of feed; salt, 1.52% of feed; iron, per lb. of copper, 2 lb. The plant during this month made an extraction of about 80% of the copper and 60% of the silver.

Dip and Strike Calculations

On page 270 of the *Journal* of Aug. 5, 1916, equation (2) in Theodore Simons' letter was inverted. It should be

$$Tan\ b = \frac{sin\ c}{m - cos\ c}$$

North Butte Mining Co., Butte, Mont., reports a net income of $1,127,646 for 1915. During the year 386,899 tons of wet ore was mined, 83 tons of wet precipitates was shipped, and the smelter treated 378,105 dry tons of ore and 56 dry tons of precipitates. This ore produced 19,235,285 lb. of fine copper, 940,631 oz. of silver and 1,121 oz. of gold. During the year 19,725,510 lb. of copper was sold and delivered at an average price of 16.703c. per lb. Sales and delivery of silver amounted to 944,284 oz. at 50.276c. per oz. Gross sales made during 1915 for immediate and future delivery amounted to 27,805,869 lb. of copper at prices averaging 18.114c. per lb. Many of these sales cover the copper to be produced during the year 1916 and the deliveries of the same to extend through that year. The average cost of producing copper was 15.741c. per lb., and after deducting 2.619c. for gold and silver content, the net cost of copper was 13.122c. per lb. Dividend payments aggregated $387,000 during the year.

Conditions in Mexico

By "A Man from Mexico"

SYNOPSIS—A review of conditions existing in Mexico at the present time, showing the difficulties of prosecuting legitimate work. The financial situation is the worst of many bad features.

There is no country in the world in which the truth is so hard to find as in Mexico It is the land of fake rumors, and the proverb that the unexpected generally happens is strikingly exemplified there. Things occur which to the ordinary stay-at-home seem impossible, and it is safe to say that if a full and true account of the happenings there during the last few years were published, it would not be believed. On the other hand, the average American knows and cares little what happens. Occasionally his attention is attracted by a larger-than-usual scarehead in the daily press, but he soon forgets about it. But if there was cause for intervention in Cuba, there are a hundred reasons for intervention in Mexico. At present we are neither at peace nor at war with that country, and this condition appears likely to continue indefinitely.

Millions of foreign capital are invested there, and if the United States does not do something before the European War ends, some other nation or combination of nations will do it. For example, the railway from Vera Cruz to Mexico City, the Mexico City tramways, the Mexican Light and Power Co. (Necaxa) and others are owned by British and Canadian investors and are being run by the *de facto* government for its own benefit, and it is unlikely that the owners will suffer in silence for very long after the war is over. The *de facto* government offered to hand these concerns back to the owners not long ago, but the latter were not foolish enough to accept them in their present damaged condition. They prefer to wait—watchfully—till the time is ripe and then exact damages from someone. Whether the Monroe Doctrine renders Uncle Sam responsible I do not care to surmise.

Traveling in Modern Fashion

Before making my last vist to the "Land of Mañana" I read the humorous account of "Railway Traveling in Mexico," in the *Journal* of Feb. 19, 1916, and was prepared for the worst. However, I was luckier than your correspondent, because there were cushions on the seats and glass in the windows, the engine did not break down, we did not have to sleep on the ground, and we made the journey in almost schedule time. True, the train was crowded, there was no Pullman from Laredo to Saltillo, no dining car on the train during any part of the journey and no soap or towels in the Pullman from Saltillo to Mexico City; the porter was drunk and affectionate toward passengers and we had to spend 18 hours at Saltillo, much of it at the station, mixed up with half the population, who are ragged and dirty, even for Mexicans; but these were only minor troubles. I found that no passport was necessary on entering the country, but on leaving a permit from the government is required. There was a farcical fumigation of baggage at Neuvo Laredo on entering, but this was simply in retaliation for the United States Government vaccinating Mexicans entering this country on account of the typhus epidemic then raging. While this farce is being enacted, the passenger is surrounded by and brushing against Mexicans wrapped in blankets, some of which are probably inhabited by the louse that spreads the fever. However, I suppose it is all right. It is only the imported louse that the patriotic Mexican objects to and pretends to destroy. Around the mines one is in constant danger from the same source. Thousands of Mexicans and several Americans, including one doctor, have died from the disease carried by the louse.

Passing through the state of Neuvo Leon, the only features of the landscape were unroofed houses, burnt freight cars and bent (dynamited) rails, and at the stopping places, a crowd of filthy women and children selling *tortillas, tomales, leche, agua,* etc. After dark there was no light on the train. On arrival at Mexico City we passed (in a cab) the many triumphal arches erected to welcome the First Chief. These were built several months before, but the *Primer Jefe* had not yet arrived. Rumor says that one of them was found to be charged with dynamite to which a wire was attached and that the discovery led to several workmen losing their lives about sunrise one fine morning near an adobe wall. About two months after this, Mr. Carranza entered the city suddenly from Queretaro, and ordered all the arches to be removed within 24 hours. In Pachuca, also, arches were prepared and stood for months and were finally removed without ever being used.

Conditions in Mexico City

The sale of *pulque* was forbidden in the city and one could not get a drink of any kind unless something to eat was ordered. However, the restriction on *pulque* has been withdrawn and the great national industry is again flourishing. In March a telegram of 12 words from Mexico City to Pachuca (90 km.) cost the equivalent of 3c. United States currency. Needless to say, the Western Union does not run this service. Postage to the United States was equal to $\frac{1}{10}$ of 4c. (U.S.) and the fare to Pachuca 24c. (U.S.) for a 3-hr. journey. On Feb. 29 a peso was worth 4c. (U.S.) and on Mar. 23, 2c. Merchants used to close their shops or prolong the siesta interval rather than accept this kind of money, so the government issued a decree that if they closed, they remained closed forever. The cost of running the mess at the mine was about $10 per month per man.

When the American troops entered Mexico after the Columbus raid, it was considered good policy to sleep with your boots on and your grip packed. *Gringoes* began to leave the country on various pretexts, and some of those who remained behind sent their wives out. Along the line to the border, crowds collected at the stations and howled for the blood of the *gringoes.* American newspapers came through irregularly, some (for example, the New York *Times*) hardly ever. San Antonio *Light* seemed the most regular. One American entering Mexico, who had an American paper in his pocket, was relieved of it at the border by a Mexican official. Americans are despised, and if one or two are in a car

full of Mexicans, they are likely to be insulted. Even if there is no war, it will not be safe for Americans to return till something is done to make the Mexicans have more respect for foreigners.

Zapata has been rather quiet lately. It is said that he is working the Campo Morada Mine and making silver coins. His troops are close to Mexico City and surround El Oro district. Carranza sent Pablo Gonzales against him, and he captured Cuernavaca. Carranza then sent a trainload (about 300 people) to Cuernavaca to administer the government there. This train also carried much ammunition and a considerable amount of the new *infalsificable* paper money. Zapata held up the train, killed the men and old women, and took away the eligible women and girls, the ammunition and the new money, and probably has them still. This happened a few miles south of Mexico City, so it will be seen that the power of the *de facto* government does not extend very far. Trains on all lines are frequently held up and passengers robbed and sometimes killed and the train burned. Sometimes the train is only fired at. For this reason some people thought it safer to stay in than try to get out of the country. The government would not sell postage stamps unless one brought his letters and showed them to the attendant.

The Tangle of Currency

In May the export duty on bullion was raised to 10% ad valorem, the stamp duties were doubled, and mining taxes increased. At the same time millions of rounds of ammunition were purchased—from the United States of course.

Bills above the value of 10 pesos (Vera Cruz issue) were not good unless *resellado*. There were many counterfeits in circulation—even the re-seal being forged. Sometimes when one took his bills to the government to be re-sealed, they would declare them counterfeit and confiscate them. It is said that one intelligent bunch of bandits once stole the government printing press and made quite a lot of money before the authorities recovered it.

Mexican pickpockets are as clever as ever and are reaping a harvest in the overcrowded street cars in Mexico City. Boys at the mines rob the miners on payday. The law is that anyone found guilty of theft shall be shot, but in spite of this many *peones* takes chances and the law is not strictly enforced, otherwise the country would soon be depopulated.

As the result of a strike engineered by the *Casa Obrero Mundial* (a branch of the I. W. W.) and probably backed by the state or federal government, the miners at Pachuca got a raise of wages in May. Until then they had been getting about 3 pesos per day paid in Vera Cruz paper money, plus a *gratificacion*, or present, of 250%, plus a bonus for regular attendance, plus a certain quantity of maize at less than cost price, plus car fare to and from Pachuca. Under the new arrangement they get (if they work five days per week) 50% of their old wage paid in *oro nacional* or its equivalent in paper money at the official rate of exchange, maize at cost price, no *gratificacion*, and no car fare. Those who do not work five days per week will get 25% of their old wage in *oro nacional* or its equivalent. The mining companies will open stores and sell to their employees at cost. This arrangement will considerably increase the cost of mining and milling. Let us hope that the price of silver will counterbalance this.

When the new money came into circulation, the newspapers operated or backed by the government called on people to be patriotic and hand in the old money to the government, who would destroy it and thus reduce the national debt. I am not aware that it was reducced to any considerable extent, so the government resorted to stronger measures.

On May 20 there was a general strike in the Federal District, which Carranza squashed by telling the strikers they would be treated as rebels if they did not go back to work. On June 1 the postage rates were raised to 10 centavos *oro nacional* or its equivalent for letters to Mexico and the United Streets. This is equal to about 5c. gold.

Owing to the refusal of the United States Government to withdraw Pershing's troops after their failure to capture Villa anti-American demonstrations took place in several towns, in one case at least led by the state governor and assisted by Carranzista soldiers. This finished up with the usual cry of "death to the *gringoes*." It is estimated that at that time there were about 15,000,000 Mexicans and 3,000 Americans in the country. From the tone of the government press *El Pueblo* and *El Democrata* it was evident that Mexico intended to fight whether the United States would do so or not. Of course this was Carranza's plan to consolidate his people. Up to this time the press had not said anything uncomplimentary about Wilson—rather the reverse—but it made up for lost time when it started.

Modern Mexican Finance

In spite of the government's declaration that the Vera Cruz bills would be valid till the end of June for all purposes and after that for payment of taxes, railway freight and fares, on June 2 it issued a decree that bills of 20, 50 and 100 pesos would be of no value after June 5.

This was an easy way to reduce the national debt. Other hard-up countries might copy it. They explained that this would not hurt the poor man, as he would not be likely to have large bills. This is about the most foolish thing the so-called government has done so far. Of course the mining companies, business firms, clubs and private individuals were caught with large quantities of this valueless paper. As it was the day before the weekly pay, the companies had much money on hand which they had to throw aside and replace hurriedly with the *infalsificable* bills or Vera Cruz bills of small denominations. One large mining concern pays about one million pesos (old issue) per week. These *infalsificable* bills had to be bought from the government at the rate of 10c. (U.S.) per peso, that being the rate fixed by the government, which has put all the money changers out of business by decree.

I heard of one case of an army officer who knew that the government intended to repudiate these Vera Cruz bills. He went to a broker in the city and bought a draft on New York for $10,000 and paid for it in these bills, which were declared worthless next day. Of course the broker could do nothing. Probably he is now "broke." Might is emphatically right in Mexico at present. There were anti-government demonstrations, which of course

effected nothing. The government announced a lottery scheme by which it would gradually redeem these bills, but everyone looks on them as worthless.

Food was scarce and dear in the city in June, and the only restaurant in which one could rely on getting a meal was the one in which three Carranzista officers were killed one night a few months ago. I believe that even that was closed shortly after I left the city. Meals cost about the same as in the States. The American Club seemed fairly well provided. Some foreigners had to live on beer and sandwiches for several days.

The shops appear to carry very small stocks of goods, but probably they have more in the background. The government has fixed the price at which foodstuffs must be sold, and owing to the unsatisfactory money position, merchants of all kinds wish to sell as little as possible—especially of imported goods, for which they have to pay real money. The less they sell the less money they lose. Some firms were fined for charging too much, and at least one large American firm either closed voluntarily or was closed by order. The scarcity of food is partly due to the fact that the producers do not care to sell for "money" that may be declared worthless at any moment. After the government repudiated the larger bills it was freely rumored that it also intended to declare the smaller ones no longer valid, so many people invested in duty stamps which they did not really require. Carranza and his gang have persistently persecuted the merchants, declaring that they are the cause of the scarcity of food. As a punishment, some of them were compelled to sweep the streets in Mexico City, and the newspapers had a picture of them doing so with a crowd looking on. By the way, rarely a day passes that these papers do not have a picture of Carranza on the front page, posing in some attitude or other.

There was a football match one Sunday between Spaniards and British for the benefit of the Allies' Red Cross at the Reforma Club, near Chapultepec. To see the well-dressed crowd one would not guess at the real condition of the country.

The Public Gardens

The Plaza de la Constitucion (Zocalo), in which there were formerly trees, statues and a band stand, is now a bare, open space. This will facilitate the shooting down of the people by machine guns on the roof of the National Palace, as was done during the *Docena Tragica*. The Alameda has not been injured and even now it is well looked after. Needless to say the new National Theater—that magnificent building of white marble—is still unfinished and is said to be slowing sinking, like the houses in the Avenida Juarez, the city being built on a bog. The new steel-frame capitol building is still in the same state as it was a few years ago. Cuernavaca, once a fashionable resort, is now in a filthy state. A man told me he saw horses and burros looking out of second-story windows.

The train on which I traveled to Vera Cruz did not include any Pullmans or their equivalent. The Mexican Ry. ("The Queen's Own") formerly had its own sleeping cars, but since the government took over the line, these have either been worn out or are being used on other lines, probably as homes for officers and their lady friends. But there were two carloads of soldiers—mostly on the roofs—besides those who traveled (on passes) in the first-class car. The train, as usual, was overcrowded, and to get a seat one had to be at the station before 5 a.m. Trains now run only in the daytime. At each station along the line a file of "soldiers" was drawn up, consisting mostly of old men and boys, dirty, ragged, barefooted or sandaled, with rusty rifles and belts of cartridges.

At one stage of the journey the soldiers on the roof started shooting at a rabbit and the officers in the train joined in firing through the windows of the car. Some of the passengers, thinking that the train was being attacked by bandits, followed the custom of the country and lay down on the floor. The rabbit escaped.

Saving an Exit

The large bridge near Maltrata is guarded by a force of soldiers night and day. This part of the line reminds me of the Short Line from Colorado Springs to Cripple Creek. It is believed that Señor Carranza means to keep this line open if possible, in case he has to leave Mexico City like some of his predecessors, and that he has had part of the old prison of San Juan de Ullúa in Vera Cruz harbor, fitted up as a palace in case of emergencies.

The journey to Vera Cruz occupied 16 hours instead of the usual 10 or 12, and the fare was 108 pesos of Vera Cruz money. As no foreign engineers are now employed on the railroads, there is frequently trouble with the engine. After dark there were no lights in the train nor, as far as I could see, any headlight on the locomotive. Some hundreds of foreigners who stayed in Mexico City till ordered out by the United States Government had to travel in box-cars and cattle trucks and were 36 hours on the way. When they got to Vera Cruz, all hotels were full and they had to sleep on the battleship "Nebraska."

The buzzards are still a feature of Vera Cruz. It is said that they left when the American troops were in occupation, but returned the day the troops evacuated the city.

On June 7, in Mexico City the official rate of exchange was 4 pesos, Vera Cruz issue, for one peso *infalsificable*. On June 9, in Vera Cruz it was 8.30 pesos for one *infalsificable*, and a few days later 10 for 1. The government has stopped the *coyotes* (money changers) from depreciating the value of the paper and is now doing the same thing itself.

Some of the foreign business people in Vera Cruz were fined for giving and accepting American money in the course of their transactions. As a result, one shipping company would not accept fares in United States currency, although that had hitherto been the custom. One has therefore to buy Mexican money from the Government at 10c. (U.S.) per peso. In this way the government becomes possessed of real money with which to buy ammunition and line the pockets of the faithful. Neither will it allow banks to cash checks drawn in United States currency. The manager of the Bank of London & Mexico was arrested for refusing to accept Mexican paper money. But the best joke of all was that the government would not allow people who were leaving the country to exchange a draft on New York for American money or travelers' checks. Evidently they mean to force the new paper currency on the people, though it is of no value outside of Mexico.

One has to get permission to leave the country and has to tell them all about himself, and all baggage is carefully examined at the custom house to make sure that no gold or silver is being taken out of the country. On boarding the steamer your are met by an official who asks if you have any Mexican silver money in your possession, and woe betide you if you have. During the eight months that I have spent in the country I have seen only one piece of silver money.

If going to Cuba, one has to be vaccinated at the office of the Cuban consul in Vera Cruz, for which, strange to say, no charge is made.

There is little shipping business now at Vera Cruz. Wharves are deserted and the rails rusty. There are 30 or 40 hydraulic cranes falling to pieces for want of paint, and water pipes leaking at every joint.

The stone verandas of the warehouses near the harbor are occupied by dirty, half-naked women and children who pass the time hunting for vermin in one another's hair. Box-cars are drawn up near the harbor to catch the breeze, and also near the station, and occupied by officials and their families, while merchants and mining companies up-country cannot get goods forwarded. There are several large half-ruined buildings and dismantled boilers along the waterfront, in which women and children seem to live, and on the stone floors of the railway station and grass plots near-by I saw hundreds stretched out after dark. Of course it is hot in Vera Cruz in June. The street cars seem to be used more as a means of getting a breeze than as a means of getting from one place to another. In the cathedral on Sunday were many male worshippers without coats and some armed with knife and automatic pistol.

Before the steamer sailed, the passengers were examined (in a leisurely Mexican fashion) by the immigration officer. Heaven knows what for, except that Carranza has to find jobs for his supporters and they have to do something for their money besides swaggering around in a uniform. Also, there are probably a few drinks attached to a visit to an outgoing steamer, so the visit is prolonged beyond the sailing hour. I understand that Mexicans who are leaving the country are subjected to a close questioning as to why, where they are going and for what purpose. Not long ago Carranza issued a proclamation stating that Mexicans should not go to the United States to look for work, but should be patriotic and stay at home.

On the way out we passed the whole Mexican Navy—two small ships—at anchor inside the breakwater, and the "Nebraska" outside.

Mexico is in a bad way, but the sun still shines and the bands play in the plazas. It would be a fine country if there were no Mexicans in it. At present it is only fit for Mexicans.

Risk Not Assumed by Miner

By A. L. H. Street*

In an action to recover for death of a miner in the Joplin district, he having been employed as assistant to a roof trimmer, and the accident occurring through fall of a slab from the roof when a larger one was pried down, the Springfield, Mo., Court of Appeals has sustained judgment in plaintiff's favor on the ground of negligent failure on the trimmer's part to make a reasonable inspection to discover the probable effect of prying the large slab down. The court decided that decedent did not, as a matter of law, assume the risk of such an accident. (Fleming vs. What Cheer Mining Co., 186 Southwestern Reporter, 1115.)

*Attorney at law, 829 Security Building, Minneapolis, Minn.

Miscellaneous Steel Production

The American Iron and Steel Association has issued Bulletin No. 4, which gives some statistics as to the production of various articles of finished iron and steel that were not included in the previous bulletins.

The production of tin and terne plates in 1915 was: Tin plates, 982,958 gross tons; terne plates, 72,978; total, 1,055,936 tons, an increase of 124,695 tons over 1914. Adding imports and deducting exports—which reached the high figure of 154,642 tons—the consumption of tin and terne plates in 1915 was 903,644 tons. There were 34 active works in 1915. Of the tin plates made 43,172,676 lb. were charcoal plates.

The production of galvanized sheets in 1915 was: Iron, 33,729,945 lb.; steel, 1,660,107,051; total, 1,693,836,996 lb. This is a decrease of 245,433,742 lb. from 1914. There was a large increase in the make of sheets in 1915, and the decrease given was due entirely to the high price of zinc, which caused the use of black or painted sheets in place of galvanized.

The production of rail joints and fastenings in 1915 was: Iron, 46,931 gross tons; steel, 423,793; total, 470,724 tons, an increase over 1914 of 98,182 tons.

The production of pipes and tubes in 1915 was, in gross tons: Black, standard 823,767; galvanized, 280,944; oil-country goods, 602,920; O.D. and miscellaneous, 115,113; boiler tubes, 96,930; total, 1,919,674; whereof 206,713 tons were made of iron and 1,713,161 tons of steel. Compared with 1914, there was an increase of 181,970 tons. The total of seamless steel tubes made in 1915 was 139,668 gross tons, whereof 63,488 tons were hot-finished and 76,180 tons cold-drawn. The total increase over 1914 was 49,073 tons.

The make of cast-iron pipe in 1915 was, including fittings, 1,214,870 gross tons, an increase of 54,090 tons over the previous year.

The production and consumption of nails of all kinds are reported as follows, in kegs of 100 lb. each:

	1913	1914	1915
Wire nails	13,559,727	13,132,814	14,583,026
Cut nails	842,038	769,665	775,327
Total production	14,401,765	13,902,479	15,358,353
Exports	1,062,362	885,843	2,146,353
Consumption	13,339,403	13,016,636	13,212,000

Wire nails were made in 1915 by 49 works and cut nails by seven.

The production of forgings in 1915 was, in gross tons: Iron, 2,814; steel, 520,909; total, 523,723 tons, an increase of 182,302 tons over 1914. The production of hammered charcoal-iron blooms and billets in 1915 was 43,121 tons, whereof 42,219 tons were for the marker's own use and 902 tons for sale. As compared with 1914 there was an increase of 1,696 tons.

The Refractory Zinc Ore Treatment Co. has been organized in Great Britain to put up a plant for the electrolytic production of spelter by the Isherwood process. It will be remembered that that process was tried experimentally at the Raritan Copper Works, Perth Amboy, N. J., a few years ago.

Details of Practical Mining

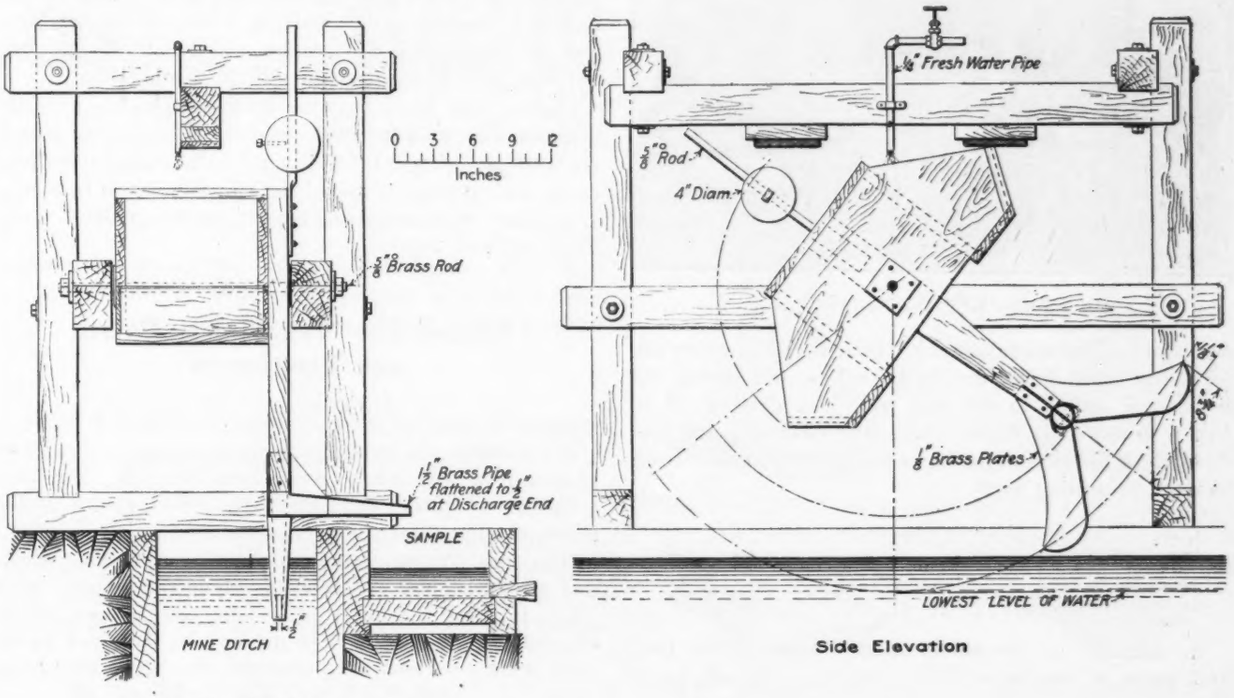
A Portable Water Sampler

By Fred M. Heidelberg*

The underground irrigation system installed by the Copper Queen Consolidated Mining Co. necessitated a method of sampling the solution in the ditch after it came from the irrigating beds and before it became mixed with the strong water from other parts of the mine. The following device proved satisfactory in accomplishing this end. Essentially it consists of a scoop on the end of a pendulum. Each time the pendulum oscillates, the scoop dips in the water, gets a sample and deposits it in a sample box at the side of the ditch. The accompanying sketch shows more clearly the details of the device. The entire pendulum consists of a right-and-left water pocket into which the water sample runs, a 4-in. iron ball on a ⅝-in. diameter rod for regulating the pendulum, the scoop and a ⅝-in. diameter brass rod acting as an axis for the assembled pendulum.

The box forming the water pockets is made of ¾-in. boards fastened together with brass screws; 3x3x⅛-in. brass plates are fastened to each side of the box and serve as a bearing for the ⅝-in. brass rod. The scoop is made of ⅛-in. brass plate cut to form two arms. One arm dips into the water for a sample when the pendulum oscillates in one direction, while the other arm dips out a sample on the return stroke. When the pendulum has come to rest, the slope of the arm is such that the water runs down to the partition of ⅛-in. brass plate between the two arms. This plate extends into the 1½-in. brass pipe, which is flattened at the discharge end so that it gives a slope down which the water runs from the arm into the sample box. The tipping of the pendulum is effected by feeding fresh water through a ¼-in. pipe. By regulating the flow of this water any frequency of oscillations can be obtained. Since each oscillation cuts out about 2 cu.in. of solution water, the size of the sample desired governs the number of oscillations.

The frame supporting the apparatus is made entirely of 3x3-in. timber dapped and bolted together. The bumping bar is likewise of 3x3-in. timber and is provided with a bumping block on which is tacked a piece of rubber belting. The function of the belting is to absorb the shock, which is small, however, with this kind of pendulum. It is to be noted that in placing this apparatus over a ditch, care should be taken not to allow the level of the water to go below the point at which the scoop will take up a sample. This level can be maintained by putting a small dam at a point in the downstream end of the ditch which at this point must be so widened that the water will go over the dam without raising the water in the ditch to overflowing. With a little care the necessary size for the widened parts can be easily determined. It is not a good idea to allow the snout of the scoop to touch the solution



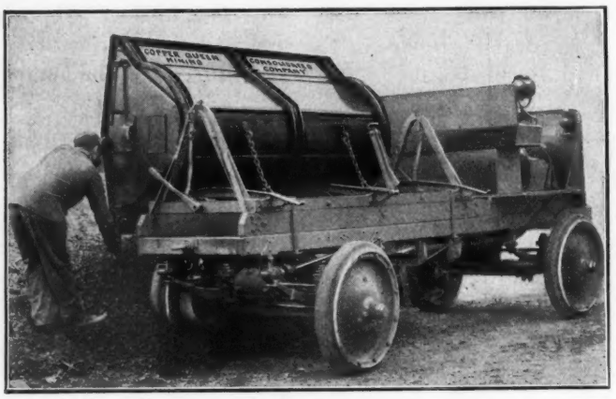
DETAILS OF SOLUTION SAMPLER

*Mechanical engineer, Copper Queen Consolidated Mining Co., Bisbee, Ariz.

water while at rest, since the water as a rule contains ingredients that gradually eat away even the brass plates. In combination with the frame this apparatus seems to have great possibilities as a portable mine-ditch sampler. It can be moved to any ditch in the mine and a sample obtained. It can also be used in the different launders of the surface precipitation plant where it is desired to watch the precipitation in each launder.

The Jeffrey Quad Two-Way Side-Dump Motor Truck

The accompanying illustrations show a new army-type of 4-wheel drive, two-way side-dump body motor truck cars used by the Copper Queen Consolidated Mining Co., for whom they are manufactured by the Thomas B. Jeffrey Co., Kenosha, Wis. The illustrations tell their



THE JEFFREY "QUAD"

own story. The manufacturers claim that the driver can leave his seat, dump the load, replace and secure the body, and return to his seat ready for driving off in half a minute. It drives, steers and brakes on all four wheels. It is an interesting adaptation of motor-truck haulage to mining work.

Tempering and Annealing*

By A. H. Hervey

An engineer is often called upon to make various tools and parts of machines which require a knowledge of tempering and annealing the various common metals.

Steel is roughly divided into four classes, according to the percentage of carbon contained and its capacity for being welded: Soft steel, which is not temperable but is easily welded; medium steel, which takes a poor temper and is weldable; hard steel, which is temperable and welded with difficulty; and very hard steel, which takes a high temper and is not weldable.

A tool of hard steel that requires shaping in a machine or filing should first be thoroughly annealed. To do this, heat the steel slowly and evenly to a dark red, then cover with ashes or powdered lime to allow it to cool slowly—the slower it cools the softer it will be. A quicker way is to use the water-annealing method. To do this heat the steel as before and hold it in a pair of tongs until all color is gone or so that when rubbed with a piece of clean pine it will no longer char the stick, then immerse it in a bath of cold water. It is now ready to be machined. Annealing weakens steel slightly, but renders it better able to stand shocks.

To temper or harden tool steel, heat it slowly and evenly to a red heat for about 2 in. from the cutting edge, then immerse it in a bath of cold water or oil to a depth of 1½ in. till the point is cold. Take the tool out of the bath and polish the scale or coating from the point with a piece of emery cloth or other abrasive, then wipe the surface with a piece of oily waste. Watch the polished surface as the color comes down from the hot shank. When the edge has reached the desired color, which can be learned only by experiment and test, immerse the entire tool in cold water. As a guide it is to be understood that the darker the color the softer the edge will be. The last operation is known as drawing. The proper color is to be determined then, by the use for which the tool is intended.

Soft or medium steel that will not take a temper can have its surface hardened to a depth of about a hundredth of an inch by casehardening. This is done by heating the steel to a dark red and placing cyanide of potash on the part to be hardened, then putting it back in the fire for a few minutes so that the cyanide will be absorbed by the hot steel, and plunging it in a bath of cold water.

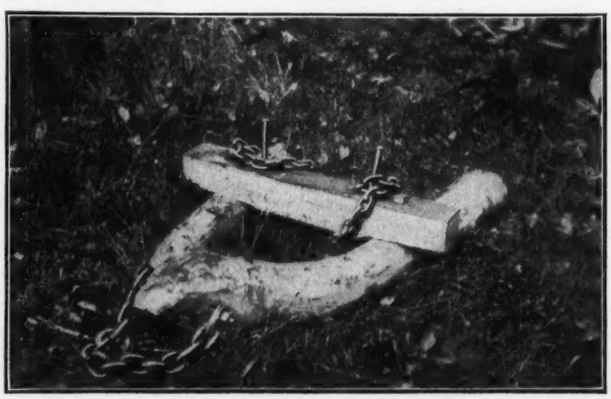
Copper and brass may be annealed by the opposite means to that used for steel—that is, by heating to a dark red and plunging into cold water or allowing it to cool in the air. If brass is heated too hot, it will fall to pieces. If properly done, brass and copper can be annealed many times without injury.

Shoe for Hauling Pipe or Timbers

By R. S. Bonsib*

We recently had occasion to haul several hundred feet of 3-in. iron pipe down a rocky mountain side. This was a difficult operation until the little device, shown in the accompanying illustration, was installed.

The shoe was made of a forked locust trunk, peeled, and the large end cut down to allow the passage of a 12x⅝-in. bolt. A piece of 4x4-in. oak lumber, about 2½ ft. long, was fastened to the fork by means of ½-in. drift bolts, to which were attached two ⅝-in. iron rods,



SHOE FOR HAULING PIPE OR TIMBERS

*"Power," Aug. 1, 1916.

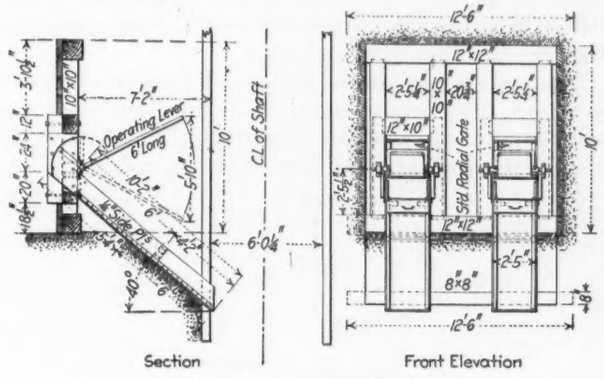
*Mining Engineer, Low Moor, Va.

about 8 in. long, which served as attachments for the chain. The threaded end of the pipe was fastened to the shoe by means of a chain, leaving the end with the sleeve to drag.

This shoe cost about $1.18 and nearly tripled the amount of pipe handled during the course of a day. It is now being used with the greatest success for hauling out props and other mine timbers.

Santa Gertrudis Loading Chutes*

As the ore at the Santa Gertrudis mine, Pachuca, Hidalgo, Mexico, is free running and unusually fine, no measuring chutes are required. The accompanying



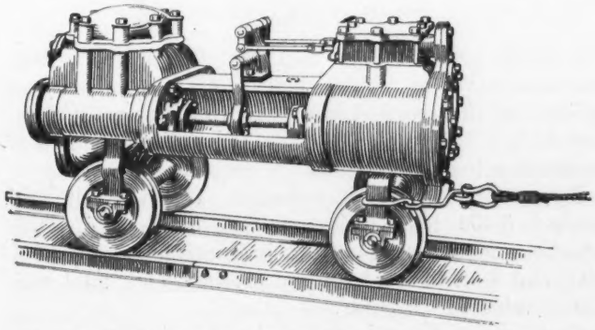
DETAILS OF LOADING CHUTE

illustration shows the type of chute used. With these chutes, having a radial gate operated by a hand lever, under favorable conditions the loading time is 15 to 20 seconds.

An Improvised Sinking Pump for Inclined Shafts

By Frederick W. Foote

An old inclined shaft had to be dewatered and retimbered for examination purposes. The equipment cost was to be charged against the examination, so that it had to be kept at a minimum. The question of pumping was an important one, as the inflow was considerable.



METHOD OF MOUNTING PUMP ON TRUCKS

A second-hand Worthington pump having a capacity of 50 gal. per min. was bought for $60. The base of the pump was bolted on two sets of wheels and axles, and a shackle was fastened to the lower part of the frame. This was done at the shop for $25, making the cost of the mounted pump $85. Wooden track was run down on the timbering. By means of flexible connections the water was lowered until a new set of timbering and headers were placed. The water was then pumped out as far as the suction would permit, and the pump was disconnected and let down to its new position and the piping reconnected. By the time the water had risen to the bottom of the headers the pump was in operation again. The water rose at the rate of about 2 ft. per hr., so that the pump could be idle long enough for the connections to be changed. By this means a shaft 130 ft. deep was successfully dewatered at a reasonable cost both for initial expense and for operation.

*Excerpt from article by Hugh Rose in August, 1916, Bulletin, A. I. M. E.

Sharpening Drills for Bad Ground

Sometimes when a miner encounters seamy or broken ground, especially when it is composed of hard, shattered rock, the ordinary drill, sharpened as shown in Fig. 2, does not give good results, for the edge is frequently

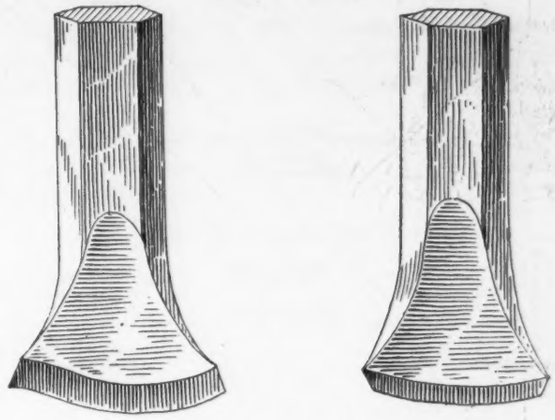


FIG. 1. SHOWING DRILL AS IT SHOULD BE SHARPENED

FIG. 2. THE OLD WAY OF SHAPING A DRILL

driven into a crack so that it is practically impossible to loosen or remove the drill, says *Coal Age*, Aug. 5, 1916.

This difficulty may be overcome by sharpening the drill as shown in Fig. 1, where it will be seen that the corners have been turned back so that the cutting edge assumes a curved outline. Such a drill point as this will ride over ordinary cracks and thus prevent sticking.

Performance Tests of Power Plants have been investigated by a committee of the American Society of Mechanical Engineers, George H. Barrus, chairman. The result is a set of rules for conducting performance tests of power-plant apparatus, issued by the Society and relating to boilers, reciprocating and turbine steam engines, pumping machinery, compressors, blowers and fans, locomotives, gas producers, gas and oil engines and waterwheels. These codes represent six years of work in revising the former codes of the Society.

Details of Milling and Smelting

Milling Scheelite-Gold Ores*

The scheelite-gold ores of Otago are handled by two main systems of milling. The first, involving coarse crushing of the ore, contemplates the recovery of scheelite primarily and of gold secondarily, whereas the second system, involving fine crushing, has as its primary object the recovery of gold.

Of the numerous mines in the district that have been exploited past the prospect stage, only three have ever attained a steady constant production; namely, the Glenorchy, the Golden Point, and the Highlay. The plans of ore treatment proved successful at these three mines have little in common, as will be shown.

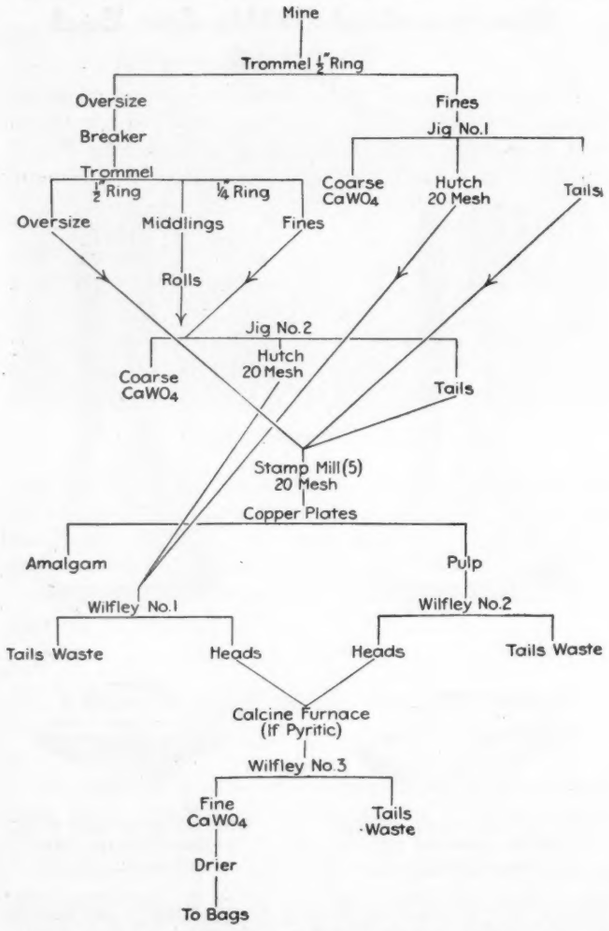


FIG. 1. GLENORCHY MILL FLOW SHEET

At the Glenorchy mine the scheelite occurs in a dense quartz gangue and has associated with it iron and arsenical pyrites. The scheelite has been deposited in the ore channel in distinct layers spaced irregularly through the barren gangue. When first resuming milling operations at this property in 1905, the recovery system followed was similar to that in vogue at Macrae's Flat, described later—stamp crushing and concentration. But after investigating the loss of slimed scheelite due to that system, the management changed to the present one, with excellent results.

The flow sheet of the present arrangement is shown in Fig. 1. Since the scheelite at this mine is very friable, the main object in this scheme is to avoid the former excessive scheelite sliming by obtaining products in the coarse stage from the jigs after subjecting the ore to the least possible amount of crushing.

The oversize that passes the second trommel contains, as a rule, very little scheelite, and this, with reject jig tails, is put through the stamp mill, from which it passes to the concentrating floor over amalgamation plates.

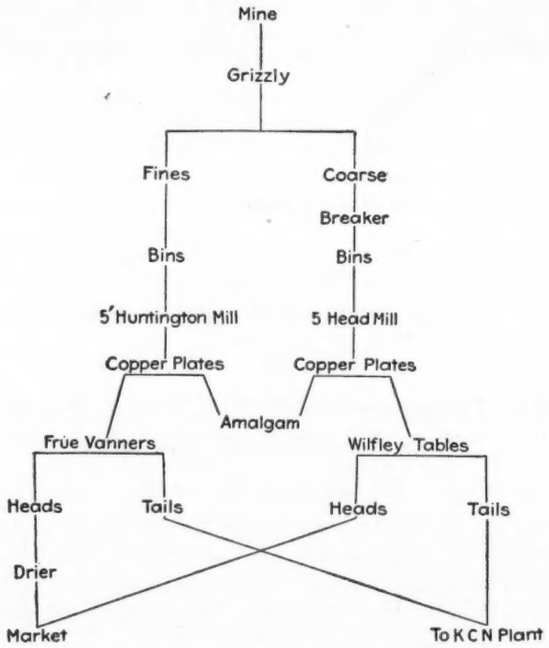


FIG. 2. HIGHLAY MILL FLOW SHEET

The hutch (20-mesh) product from the jigs is further concentrated on a Wilfley table. All concentrates, if pyritic, are then roasted in a cylindrical furnace and redressed to a 70% grade WO_3, the iron tails being sent to waste since their gold content is very low.

During eight years of operation, 1907-14, this mill crushed 5,400 tons, which yielded 547 tons of 70% scheelite and 125 oz. gold. This is an extraction of 7.09% WO_3 and £0.0087 gold per ton crushed, of a total estimated value of £59,138.

Costs are moderately low, being about 18s. per ton for mining and mill delivery and 4s. 6d. per ton for milling and dressing.

The two mills at Macrae's Flat, the Highlay and Golden Point, are both distinguished from the Glenorchy by subjecting the bulk of the ore treated to fine crushing before attempting to make a scheelite product.

*Abstract from an article entitled "The Scheelite-Gold Mines of Otago, New Zealand," by C. W. Gudgeon, in "Proceedings," Aust. Inst. M. E., No. 21, 1916.

At the Highlay mine, exhausted in March, 1913, the production of 1,000 tons of ore per month was maintained constantly for years, from which the mill produced 4 tons of 70% WO_3 and 50 oz. gold—a recovery of 0.28% WO_3 and 3s. 6d. gold per ton.

The flow sheet of the mill is given in Fig. 2. The scheme devised by the management to eliminate excessive sliming of the scheelite was to put all the fines, containing quite 60% of the total scheelite content, through a 5-ft. Huntington mill. The hard, less valuable scheelite ore was crushed by 800-lb. stamps. Pulp from the Huntington mill passed over amalgamation plates to Frue vanners and from the stamps to Wilfley tables. Direct filling of the cyanide vats was tried unsuccessfully, and subsequently only the coarser sands were cyanided, slimes being discharged to waste.

Costs at this plant were very low, being about 3s. 9d. per ton. The plant was steam-driven, supplied with

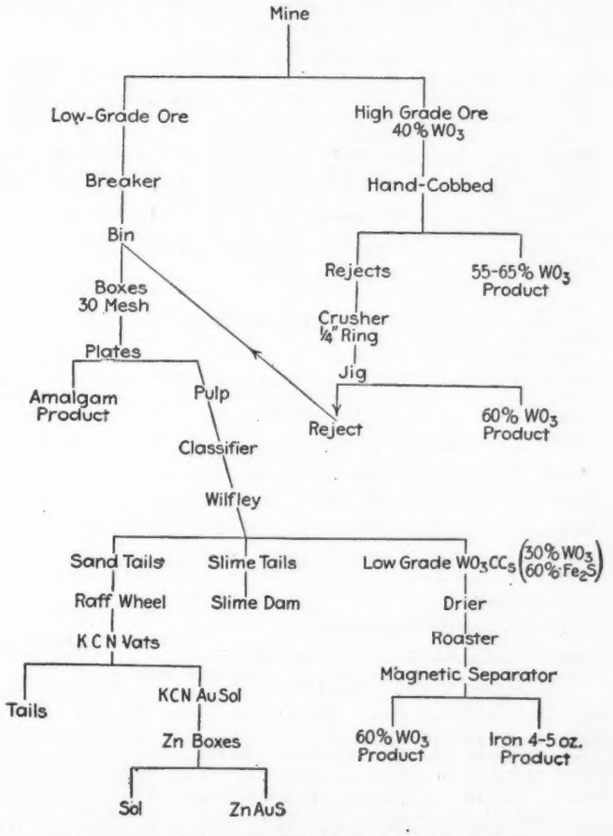


FIG. 3. GOLDEN POINT MILL FLOW SHEET

coal from its own opencut coal-pit, costing 1s. 8d. per ton delivered at the mill.

At the Golden Point the ore occurs in a quartz gangue and has associated with it besides gold, $CaWO_4$, FeS_2, As and S, a typical analysis being as follows: $CaWO_4$, 45.4%; iron compounds, 43.8%; SiO_2, 10.8%.

In the mine all the high-grade ore is bagged and sent to the surface separately, where it is hand-cobbed to a 60 to 65% WO_3 product and bagged for shipment, the rejects of this cobbing passing to the mill for treatment, as shown in Fig. 3.

The milling plant consists of a 55-b.hp. Cambridge suction-gas plant, a 10x7-in. rock breaker, ten 900-lb. stamps, feeders, Wilfley tables, raff wheel, power jig, 250-ton cyanide plant, 6-ft. cylindrical drying furnace, 9-ft. cylindrical roasting furnace, and Weatherill double-roll magnetic separator. This plant is suitable for treatment of ore from either the oxide or sulphide zones, a necessity since the lower mine levels have now reached 500 ft. where the scheelite is associated with pyrites.

Of the total gold in the ore averaging 12s. per ton, 46% is recovered from the amalgamation plates, 36% in the cyanide plant and 7% in the pyritic gold saved in the magnetic treatment. The average low-grade concentrate product of the Wilfley contains 30 to 40% $CaWO_4$, 50 to 55% pyrites and 10% SiO_2, averaging 2½ oz. gold, which concentrate constitutes from 0.5 to 1% of the total ore milled.

The magnetic-separation process in use consists of thoroughly drying the concentrates, then roasting the pyrites to the magnetic-sulphide stage, screening and separation.

In the magnetic separation 15% of the $CaWO_4$ and 21% of the SiO_2 present is deflected over together with the magnetic iron, while the machine is running with high amperage. This iron product is therefore submitted to a second roast and re-treatment, resulting in a clean iron product containing 5 to 6 oz. gold to the ton, and a $CaWO_4$ product 73.4% pure, containing approximately 61.2% WO_3.

Concentrates high in SiO_2 are jigged before going to the separation plant in order to bring the SiO_2 down to 10% or less, which is the premagnetic standard adopted.

The cost at these plants are moderately low, the average for 1,998 tons treated during the last quarter of 1914 being as follows:

MILLING COSTS PER TON

	s.	d.
Breaking, jigging	0	1 9
Stamping	2	3.9
Concentrating	0	4 0
General	0	3.8
Cyaniding	1	1.3
Magnetic separating	1	6.0
Total	5	8.9

Blueprints Without Tracings

For making blueprints from pencil drawings I make the drawing on a good grade of light-weight unsensitized blueprint paper with an H or HH pencil, says F. A. Dew, in *American Machinist,* Aug. 3, 1916. This paper has a smooth, flat surface, stands erasing well, is cheap, and makes good prints on sun or electric paper.

Use black carbon paper, face side up, under the drawing, and main outlines or any special features can be shown up as clearly as if inked in. Dimension lines can be made without carbon, and will be fainter than outlines, and so different in appearance that it is easier to read the prints than where all lines are of the same density.

For typewritten bills of material, drawing lists, specifications and price lists, use the same paper with black ribbon and black carbon, and the prints will come out very good.

Antidote for Inhaled Chlorine—According to the "Chemical Engineer" the use of ammonia as an antidote after inhaling chlorine should be rejected, as it acts as a further irritant. A drink of bromo-seltzer or whiskey, or the inhalation of alcohol, chloroform or tetrachloride of carbon is much more effective.

Company Reports

Canadian Mining Corporation

The Canadian Mining Corporation, Cobalt, Canada, reports a production of 4,563,957 oz. of silver, the net profits amounting to $1,193,395 for 1915. This company owns the Cobalt Townsite mine, the Cobalt Lake mine, the City of Cobalt mine, the Townsite Extension mine and the Little Nipissing mine. Dividends aggregating $518,750 were paid during the year. The total tonnage treated at both mills operated by the company was 131,852 tons, from which 2,922,383 oz. of silver was recovered, giving a recovery of 86.22%. The high-grade ore yielded 1,641,573 oz. of silver. The following table gives details of the silver produced:

SILVER PRODUCTION

	Townsite-City Mine		Lake Mine		Total	
	Tons	Oz.	Tons	Oz.	Tons	Oz.
Shipping ore:						
High-grade ore	396.6	928,301	369.2	656,685	765.8	1,584,986
Low-grade cobalt ore	260.4	56,587	.....	.....	260.4	56,587
Milling ore	97,133.0	2,002,517	34,720.0	919,866	131,853.0	2,922,383
Total	97,790.0	2,987,405	35,089.2	1,576,551	132,879.2	4,563,956

There were 14,476 ft. of drifts and crosscuts, 1,203 ft. of raises and 106 ft. of winzes run at a cost of $12.06 per ft. In addition to this development work, some diamond drilling was done at a cost of $3.23 per ft. The stoping cost was equal to 19c. per cu.ft. broken or $2.51 per ton broken. An average of 426 men were employed per day, of which 89 were engaged in milling, 305 in mining and 33 in miscellaneous work. For the total tonnage treated all labor employed in mining averaged 1.41 tons per man shift.

The total cost of power consumed was $144,333 or $1.086 per ton of ore. The accompanying table will give details of power costs.

In machine drilling there were 17,776 machine shifts of 8 hr. each worked, which includes time employed in setting up, tearing down, mucking back, staging, scaling, etc. The total number of working days for machines amounted to 309.5, giving an average of 57.4 machine shifts worked per day. The accompanying table gives detail figures on machine drilling during 1915.

The following table gives a comparison of costs for 1914, during which 132,879 tons was treated, and 1915, during which 107,385 tons were treated:

1914 AND 1915 COSTS

	Total Cost		Cost per Ton		Cost per Oz. in Cents 9 Mo.,	
	1915	9 Mo., 1914	1915	9 Mo., 1914	1915	9 Mo., 1914
Extraction	$231,853.43	$179,542.64	$1.74	$1.67	5.08	5.64
Development	58,370.03	90,108.00	.44	.83	1.28	2.83
Exploration	133,955.41	68,883.65	1.01	.64	2.93	2.16
Milling and reduction	446,221.46	260,400.73	3.36	2.43	9.78	8.18
Freight and realization	204,331.11	147,682.20	1.54	1.37	4.48	4.64
Administration and general	104,651.85	83,064.94	.78	.77	2.29	2.60
Total cost at mine	$1,179,383.29	$829,682.16	$8.87	$7.71	25.84	26.05
Royalties, taxes, manager's commission and head office	170,158.68	154,896.93	1.28	1.45	3.73	4.86
Grand total	$1,349,541.97	$984,579.09	$10.15	$9.16	29.57	30.91

Powder consumption amounted to 355,623 lb., of which it took 1.866 lb. per ton of ore and stoping, 21.689 lb. per ft. of shaft sinking, 12.586 lb. per ft. of raising and 11.46 lb. per ft. of drifting and crosscutting. The general average consumption of powder per foot of development work

POWER CONSUMPTION—1915

Cost per ton is based on total tons treated, including high-grade ore

	Electric			Compressed Air			Steam		Totals	
	Kw.-Hr.	Total Cost	Cost per Ton	Cu.Ft.	Total Cost	Cost per Ton	Total Cost	Cost per Ton	Total Cost of Power	Total Cost per Ton
Lake drainage	454,700	$6,849.91	$0.052	160,000	$40.00	....	.....	....	$6,889.91	$0.052
Water-supply	860,680	10,755.33	.081	.....	.....	....	.....	....	10,755.33	.081
Drilling	.....	.....	....	141,895,040	34,954.93	$0.263	.....	....	34,954.93	.263
Hoisting	.....	.....	....	37,368,521	9,200.73	.069	$2,947.49	$0.022	12,148.22	.091
Mine pumping	.....	.....	....	35,963,939	8,854.64	.067	.....	....	8,854.64	.067
Blacksmith shop	.....	.....	....	13,332,618	3,282.59	.025	.....	....	3,282.59	.025
Lake mill	1,633,973	12,253.71	.092	253,248	62.40	....	1,544.02	.012	13,860.13	.104
Lake lighting	75,998	638.94	.005	.....	.....	....	.....	....	638.94	.005
Cobalt Reduction Co.	3,276,353	37,105.26	.279	9,983,030	2,573.88	.019	5,064.59	.038	44,743.73	.336
Cobalt Reduction lighting	130,699	1,481.84	.011	.....	.....	....	.....	....	1,481.84	.011
Heating	.....	.....	....	.....	.....	....	6,504.30	.049	6,504.30	.049
Other	.....	.....	....	888,520	218.93	.002	.....	....	218.93	.002
Totals	6,432,403	$69,084.99	$0.520	239,844,916	$59,188.10	$0.445	$16,060.40	$0.121	$144,333.49	$1,086

MACHINE DRILLING—1915

	Number of Holes Drilled		Footage of Holes Drilled		Tons Ore Broken		Footage Advanced: Raising			Sinking			Drifting and Crosscutting			Grand Total		
Machine Shifts Worked	Total Number Holes	Per Machine Shift	Total Feet	Per Machine Shift	Total Tons	Per Machine Shift	Machine Shifts	Total Feet	Per Machine Shift	Machine Shifts	Total Feet	Per Machine Shift	Machine Shifts	Total Feet	Per Machine Shift	Grand Total Feet	Per Machine Shift	
Ore extraction:																		
Drifting ... 2.5	.....	...	.....	....	28.0	11.20	.....	.....	...	....	....	...	.....	.....	...	.....	...	
Raising ... 22.0	.....	...	.....	....	117.5	5.34	.....	.....	...	....	....	...	.....	.....	...	.....	...	
Stoping ... 11,484.0	61,247.5	5.33	329,562.0	28.64	91,942.5	8.01	22.0	23.5	1.07	....	....	...	2.5	7.0	2.80	30.5	1.24	
11,508.5	.....	...	.....	....	92,088.0	8.00	.....	.....	...	....	....	...	.....	.....	...	.....	...	
Development. 1,858.3	15,878.5	8.54	79,876.5	42.98	.....	....	534.4	495.0	0.93	91.0	48.0	0.53	1,232.9	3,399.5	2.76	3,942.5	2.12	
Exploration.. 4,408.5	41,317.0	9.37	206,374.5	46.80	.....	....	604.0	708.0	1.17	33.8	58.0	1.72	3,771.7	11,077.0	2.93	11,843.0	2.69	
Total and average. 17,776.3	118,443.0	6.66	615,813.0	34.64	92,088.0	8.00	1,160.4	1,226.5	1.06	124.8	106.0	0.85	5,007.1	14,483.5	2.89	15,816.0	2.51	

was 11.617 lb. per ft. The total cost for powder, which includes grades containing 60, 50 and 40%, amounted to $49,146. The average cost of powder per sinking was $3.12 per ft., for raising $1.74 per ft., for drifting and crosscutting $1.61 per ft. The general average cost of powder for development work was $1.63 per ft. The cost of powder for ore stoped was 25.3c. and the total cost of powder for stoping and development of ore treated was 37c. per ton.

The capital expenditures during the year aggregated $100,610, of which $90,745 was written off as depreciation. Ore reserves are estimated at 101,135 tons, containing 3,937,000 oz. of silver. It is stated that the plant, equipment and physical condition of the mill is more efficient and up to date than at any previous time.

⁂

The Laurium Mining Co. of Michigan reports for 1915 as follows: Mine expenses, $1,002; mine taxes, $2,675; Eastern expenses, $1,455; interest, $724. Receipts were $1,200 from the sale of a lot, leaving a balance of liabilities at Dec. 31, 1915, of $19,313.

⁂

Cliff Mining Co. of Michigan reports an expenditure of $12,026 in development and exploration in 1915, miscellaneous expenses and eastern office of $1,271, and interest receipts of $1,031. This meant a decrease in net assets of $12,266, leaving net assets on Dec. 31, 1915, of $24,113. Diamond drilling amounted to 3,686 ft.. of which 2,141 ft. was on the Ashbed lode. The lode was found to be 25 to 32 ft. thick, but practically barren of copper. Two holes were put down to explore the Calumet conglomerate and Osceola amaygdaloid, but no commercial copper was found.

⁂

The Right of Way Mines, Ltd., operating at Cobalt, Ont., reports for year ended Dec. 31, 1915, shipments of 308,627 lb. of high-grade ore, concentrates and metallics, carrying 102,-274 oz. of silver with 24,057 lb. of ore on hand, estimated to contain 11,262 oz. of silver. Development work at the mine amounted to 522 ft. and 5,754 tons of ore were sent to the concentrator. Profits amounted to $12,662 from direct operations, and after adjustment of interest, general expense, etc., to $4,855. Extraction of low-grade ores will be carried on vigorously in the forthcoming year. A dividend of ½% was paid on Mar. 16, 1916.

⁂

Superior Copper Co. of Michigan reports treating 212,051 tons of rock in 1915 at a cost of $1.88 per ton, producing 18.23 lb. of copper per ton, or 3,866,484 lb. of copper. Mining expense was 10.31c. per lb.; smelting, freight, commission, etc., 1.91c.; interest, 0.07c.; a total of 12.29c. per lb. The copper sold at 18.125c. per lb., or $700,820, and silver sales were, $19,-405. Mining expenses were $398,379; smelting, freight, commission, Eastern office, etc., $74,041, and interest was $2,788, leaving an operating profit of $245,017. The expense of acquiring 18,836 shares of the Lake Milling, Smelting and Refining Co. was $240,000, and assessments on account of this company were $5,615, making a decrease of $598 in quick assets for the year. The balance of quick assets on Dec. 31, 1915, was $216,275. Sinking amounted to 281 ft., and drifting and crosscutting to 4,199 ft. No. 1 shaft is now 2,469 ft. below the surface.

⁂

Allouez Mining Co. of Michigan reports dividends of $200,-000 paid in 1915 (the first payments by this company) and an increase in quick assets of $599,988. The balance of quick assets on Dec. 31, 1915, was then $963,811. Comparative figures for 1914 and 1915 were as follows:

	1914	1915
Tons of rock treated	354,457	534,705
Cost of mining, milling and taxes per ton of rock	$1.538	$1.365
Pounds of mineral obtained	9,408,470	14,506,440
Pounds of refined copper	6,056,548	10,043,459
Per cent. of copper in mineral	64.37	69.23
Pounds copper per ton of rock	17.09	18.78
Mining expense per pound of copper	9.26	7.27
Construction	0.00	0.19
Smelting, freight, commissions, etc.	1.83	1.84
Interest paid	0.09	0.01
Total cost per pound of copper	11.18	9.31

There was 45 ft. of shaft sinking and 4,858½ ft. of crosscutting done in 1915. No. 1 shaft is now 3.544 ft. deep.

The La Salle Copper Co. of Michigan reports a decrease of assets of $15,522 in 1915, leaving a balance of assets on Dec. 31, 1915, of $94,636. A summary of its operations for the last three years is as follows:

	1913	1914	1915
Tons of rock treated	2,221	45,509	80,959
Pounds of copper produced	43,906	540,731	782,493
Pounds of copper per ton of rock	19.76	11.88	9.67
Feet of sinking	0	94	0
Feet of drifting	141.4	1,123.1	1,125.6

The copper produced sold for 18.22c. per lb. and silver sal.. amounted to $6,035. The deepest shaft is No. 1, 2,146 ft. down Stamp-mill facilities became available in July at the Franklin mill.

⁂

Tamarack Mining Co. of Michigan reports treating 217,027 tons of rock in 1915 at a cost of $2.52 per ton. From this 6,139,824 lb. of mineral was obtained, from which 3,888,150 lb. of copper was derived, or 17.9 lb. copper per ton of rock, and 63.33% copper in the mineral. Costs were: Mining, 14.04c.; construction, 0.82c.; smelting, freight, commissions, Eastern office, etc., 2.11c.; interest, 0.10c.; total, 17.07c. The copper sold for $742,796, leaving a net working profit of $78,988. The sale of the mill netted $230,000, making an increase in assets for the year of $308,988, and a net balance of assets as of Dec. 31 of $1,204,981. A total of 880 ft. of underground work was done. No. 5 shaft was 5,308.5 ft. below the surface at the end of the year. The report also deals at length with the offer of the Calumet & Hecla company to purchase the Tamarack stock at $3,563,486 or $59 per share, assuming and paying the debts of the Tamarack company and leaving it its stock in the Mineral Range R.R. This deal was blocked later by dissenting shareholders.

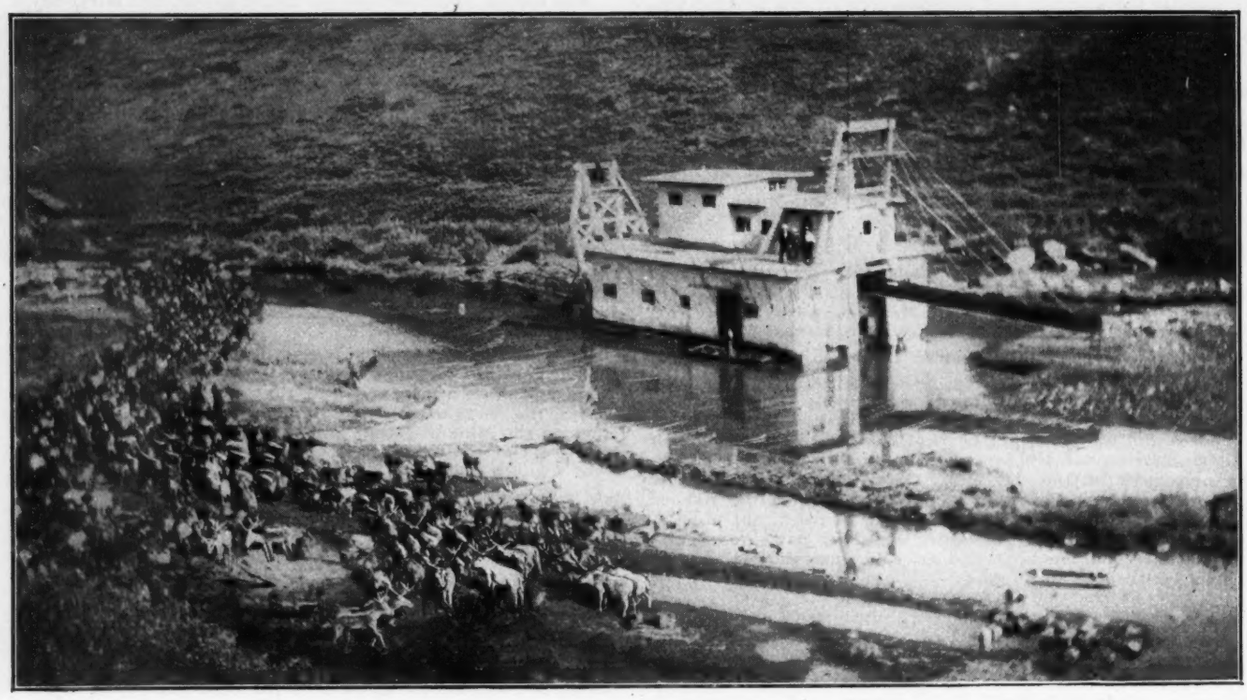
⁂

White Pine Copper Co. of Michigan reports treating 114,-039 tons of rock in 1915, at a cost of $2.182 per ton of rock. From this 24.76 lb. of copper per ton of rock was recovered. Costs were: Mine expenses, 8.80c. per lb.; construction, 5.64c.; smelting, freight, commissions, Eastern office, etc., 2.04c.; interest, 0.16c.; a total of 16.64c. per lb. of copper. There was 2,824,145 lb. of copper produced, selling at 18.353c. per lb., a total of $518,319. There were 18,460 shares of preferred stock sold at par, $25, giving receipts of $461,500. Expenses as reported in gross do not agree with the costs per pound of copper as given above, probably due to some not evident method of considering construction costs. The figures as given are: Mining, $291,327; construction, $351,438; smelting, freight, commission, Eastern office, etc., $58,330; interest, $4,377, or a total of $705,473, equal to 24.63c. per lb. The balance of quick assets on Dec. 31, 1915, was reported at $139,786. Sinking amounted to 169 ft. during the year; crosscutting to 8,605 ft. No. 2 temporary shaft was 183 ft. deep, No. 3 inclined shaft, 1,090 ft., and No. 4 was 978 ft. from the surface on Dec. 31. The stamp mill was put into commission in April, 1915. There are two units of a nominal capacity of 500 tons each.

⁂

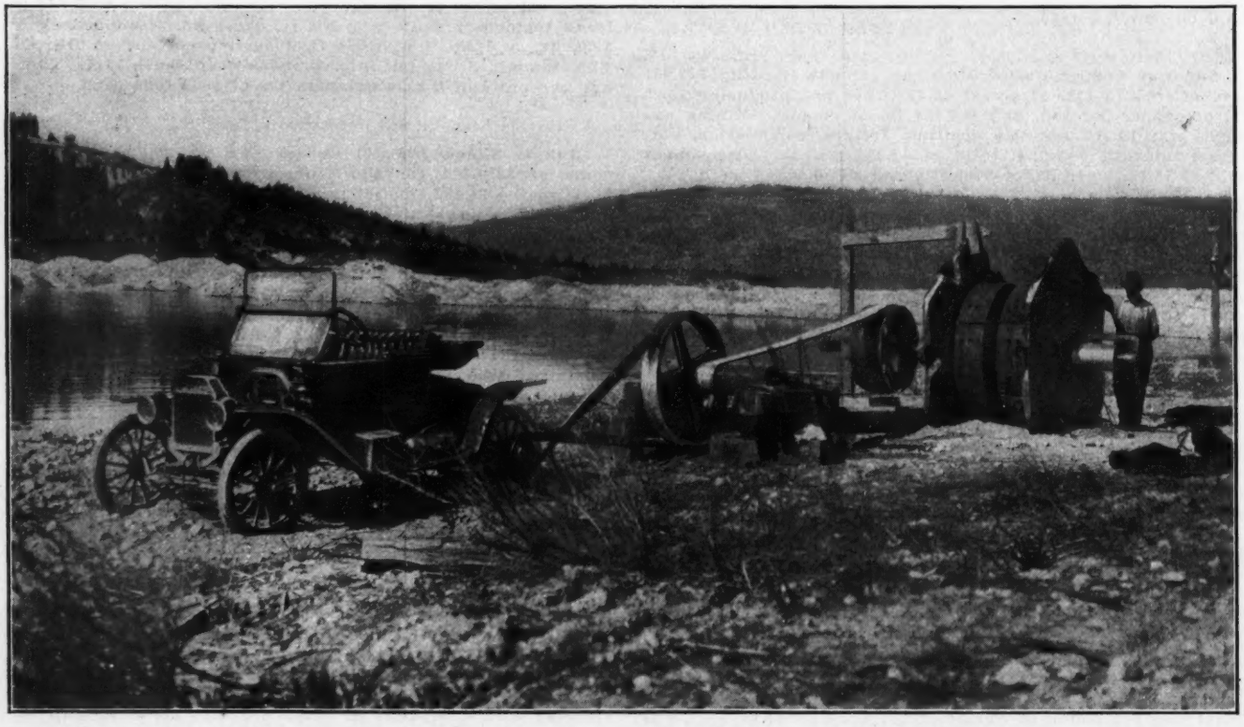
Buffalo Mines, Ltd., of Cobalt, Canada, report a net income of $231,344 for the year ended Apr. 30, 1916. The mill treated 37,152 tons of milling ore and 1,005 tons of sand and slime tailings, making a total of 38,157 tons treated. Of this, 30,079 tons was treated by wet concentration and averaged 19.8 oz. of silver per ton, with a recovery of 431,512 oz., and 8,078 tons was treated by concentration and oil flotation. This ore averaged 25.46 oz. of silver per ton and gave a total yield of 197,601 oz. The cyanide plant treated 6,340 tons of slime averaging 10.54 oz. of silver per ton and produced 55,161 oz. The total recovery by mill and cyanide treatment was 684,274 oz. The total production of silver for the year, including sales of silver, silver on hand and unsettled for at smeltery, amounted to 705,055 oz. The development work for the year consisted of 708 ft. of raises and 1,788 ft. of drifting. In the stopes 291,636 cu.ft. of rock was broken. The total shaft work to date amounts to 2,009 ft. Total drifting to date, 18,486 ft.; and the total area stoped to date, 2,657,542 cu.ft. Waste rock broken and used for filling amounted to 5,982 tons. There is broken and ready for extraction about 8,000 tons of ore in the stopes, 5,000 tons of unbroken ore and 5,000 tons on ore dumps on surface, averaging about 18 oz., 300,000 tons of tailings from the concentrator containing 1,600,000 oz. of silver, 3,000 tons of residue from treatment of high-grade ore containing in addition to silver values cobalt, nickel and arsenic. Satisfactory results have been obtained from experimental work conducted on the residue and tailings, and a flotation plant is being constructed with a capacity of about 600 tons per day, with the expectation of treating 450 tons of tails and 150 tons of mine-run ore per day during the coming year.

Photographs from the Field



HERD OF REINDEER PASSING A GOLD DREDGE ON INMACHUCK RIVER, ALASKA

The reindeer seems to be animal of rare discernment. They linger about this Union Construction Co. dredge with white men in plain view. They are protected against harm or captivity by white men, but the Government allows the Esquimaux to hunt and herd them



THE "UNIVERSAL CAR" AT WORK IN THE DREDGING FIELDS OF ALASKA

Turning down a tumbler bearing. Dredge pond, 1,280-ft. face. Dredge in the left-hand cornor of pond not visible in this view

—Main St., Rush, Ark. 2—The Gloria mine, near Zinc, Ark., showing how the mines of this region are generally started; the rock pile at the right is high-grade ore. 3—The McIntosh mill, one of the few uptodate mills in the Rush district

The Morning Star mine, one of the oldest in the Rush district. It is practically a quarrying operation

Sure Pop, an important new producer in the Maumee district. It shipped over 2,000,000 lb. of high-grade oxidized ore in 1915

Morning Star Mill, one of the best in Arkansas

Sure Pop Mill—Two days after it began operating

VIEWS IN NORTHERN ARKANSAS ZINC FIELD, WHERE MANY NEW MINES HAVE BEEN OPENED SINCE 1915

Industrial-Preparedness Report

Three months ago the Naval Consulting Board of the United States appointed a committee on industrial preparedness with Howard E. Coffin, chairman. This committee immediately organized every state in the Union for the purpose of taking a great national inventory of the country's resources which could be drawn upon for the national defense in time of need. Such an inventory was a staggering task that well might have employed some organizations the length of a presidential term to accomplish. And yet this committee at the end of a remarkable three-months' campaign reports the task finished in some states and in many of the remainder from 75 to 95% completed.

The results are all the more noteworthy when it is remembered that the work has been accomplished with a volunteer, unpaid organization of engineers and businessmen. The engineers are members of the American Institute of Mining Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Chemical Society.

There are more than 30,000 manufacturing concerns in the country each doing a business of over $100,000 a year, and all of these are being inventoried for the purpose of ascertaining what material they are capable of producing for the fighting line. There are more than 5,000 mines of all kinds in the country, and although the inventorying of the products of these has been a mammoth job, the committee report shows the work practically accomplished.

Arizona was the first state to make complete returns through the organization headed by John C. Greenway, manager of the Calumet & Arizona Mining Co. In California, Chairman C. W. Merrill reports the work well advanced. In Colorado, Chairman R. B. Moore, of the Bureau of Mines, reports great progress. Chairman Stanley Easton of Idaho, manager of the Bunker Hill & Sullivan Co., reports the inventory virtually finished.

In Illinois, progress is being made rapidly on a very heavy job. In Chicago alone there are more than 500 chemical and metallurgical plants to be studied. The state organization is headed by Frederick K. Copeland, president of the Sullivan Machinery Co.

In Kansas, Chairman Whitaker, professor of metallurgy at the University of Kansas, reports that 95% of the state's resources will soon be inventoried. In Michigan the great work under Chairman Alex Dow, president of the Detroit Edison Co., has been split up according to territorial divisions. In the northern-peninsula mining counties the work is in charge of M. M. Duncan, director of the Cleveland-Cliffs Iron Co. The state inventory will be more than 90% completed by Aug. 1.

In Minnesota the work under Chairman H. V. Winchell is well along. In Missouri, Philip N. Moore reports that one of the state's chief contributions toward preparedness will be the output of its lead and zinc mines. Official maps have been prepared showing by reference number the location of plants inventoried, railroad connections, etc.

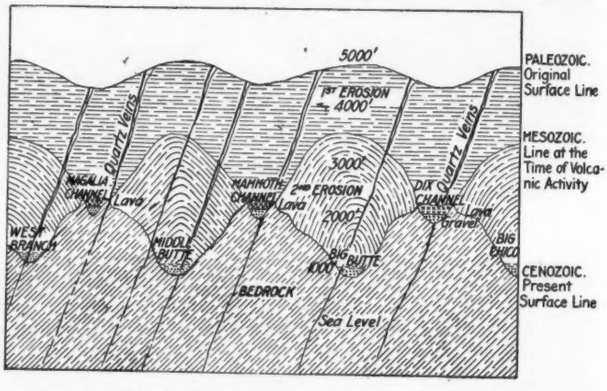
The work in Montana under the leadership of E. P. Mathewson, manager of the Anaconda Copper Mining Co., is practically completed. Full returns from South Dakota will be made in the near future by Chairman A. J. Clark, metallurgist of the Homestake company. In Utah the work of Chairman W. C. Ebaugh's organization has been carried beyond the specific scope of the inventory, maps and drawings of great value to the Government having been contributed by many great mining and industrial companies.

Congress has now practically completed legislation that will carry out the entire program of the Committee on Industrial Preparedness of the Naval Consulting Board to establish a firm and enduring foundation for the nation's defense.

The Quartz Veins of Butte County, Calif.

By J. D. Hubbard*

Even though there are a few operating quartz mines many have wondered why the quartz veins of Butte County, Calif., are not more productive. Recently a strong operating company purchased a group of mines at Forbestown, centering on the Goldbank, which has been in operation for about thirty years. The erosion since the Paleozoic Age has been so great generally that the veins have been cut away to a great depth. This is true also of adjacent counties and is a condition in parts of California which must not be overlooked and of which a careful study must be made.



TRAVERSE SECTION, SHOWING PAST EROSION AND OLD RIVER CHANNELS

The recorded production for 1914, $1,700,000, places Butte County fifth in the list of gold-producing counties of the state. Of this amount about 80% was derived from dredging, about 10% from drift mining and 10% from quartz mining and pockets. The dredge production emphasizes the erosion theory. The drift mines have been neglected for some years, although famously productive in the past. Operating companies seem to be afraid of them as "the paystreak is considered elusive." But is that not so with mining in general? Have the present generation of mining men lost their nerve? It seems that a little of the pluck of the Argonauts is needed. It may be that a lack of knowledge of this particular class of mining is lacking. There is no necessity for this, as it is simply placer mining with underground methods.

The accompanying section gives an idea of past erosion, which seems to be unfavorable to the quartz veins but highly favorable to the ancient river channels in point of future gold possibilities. The modern streams have been pretty well worked out by the early-day miners.

*Mining Engineer, Paradise, Calif.

Local quartz pockets are frequently found even yet; again indicating erosion to the observing. On the Willard claim, near Magalia, of a very pockety nature and worked by the hydraulic method, the third largest nugget in the state's history was found. This nugget weighed 832 oz. and was valued at $13,312. Another nugget weighed 132 oz., and many weighing from 5 to 11 lb. were also taken from this claim. Another great quartz fissure that runs for over 90 mi., the Mathewson dike, has been worked almost entirely by the hydraulic method. Quartz properties *per se* are not worked that way. And these big decomposed veins cannot be worked any other way without a lot of sorting.

In the foothills the gold is coarse, and the dredges in the valley get the "dust." This is only natural on account of the tendency of gold to "stay put."

It is not the object of this article to discourage the search for pay quartz in this locality, but rather to emphasize the possibilities of the ancient river channels, which received the cream of many ages of erosion in a country rich with gold. The richness of these accumulations of gold has been shown in many instances, notably in the Magalia drift mine, where the gold was literally shoveled up off certain parts of the bedrock.

The quartz veins in this county have a record of total production of many millions in gold, but the drift mines have produced more gold in the past than quartz mines and dredges combined. Much of the wealth of the modern streams came from the ancient rivers where they had been cut through and eroded by later erosions, and after the tilting of the main blocks.

It might prove advantageous for a large mining corporation to be formed to exploit drift mines only and confine its attention to them. It is safe enough and practical, and an unentered field, and the possibilities of large profits are very favorable. The drift mines are more economical in operation than quartz mines under similar conditions. The main thing is to get gravity workings if possible, when low-grade gravel may be worked at a profit. This makes the higher-grade parts clear gain. Water is indespensable of course but it is abundant in the foothill region. An expensive reduction plant is unnecessary, and simple common-sense metallurgy alone is required. Gravity and water are the keynotes. Tailings disposal is of the simplest, the coarse gravel, free from grade and water pressure settles at once, no restraining dams being necessary. There is generally a dry ravine handy for tailings disposal. Even the fine sands are readily checked with the gravel. There is a remarkable absence of clay and fine suspended material in the ancient channels, due no doubt to the natural classification of all streams where grade is concerned, and which tends to deposit all suspended material in the valleys below. A further source of profit are the black sands of the ancient channels, which carry platinum, iridium and gem stones.

Referring to the section, it should be considered as a traverse- rather than a cross-section, as the ancient streams ran generally in a southerly direction, while the modern streams run in a westerly. The tilting of the main blocks to the west after the great lava flows of the Tertiary period are responsible for this.

There are numerous quartz veins in this locality—in fact, a network of them—but they show unmistakable signs of "fissuring out," while in nearly all cases they are pockety in character, which makes mining uncertain.

We should certainly take advantage of what any locality best affords. It is the opinion of the writer that the drift gravel mines, or ancient river channel workings call to us unmistakably to explore intelligently and find for ourselves what they have to show us.

Foreign Trade in Lead and Zinc

Imports and exports of lead and zinc during June, 1916, are reported by the Department of Commerce as follows:

Articles and Countries	Gross Weight, Tons	Contents, Pounds	Contents, Dollars
Imports:			
Lead ore:			
England	7	3,034	146
Canada	3,991	3,436,800	130,281
Mexico	1,210	651,632	28,035
Chile	1,584	863,489	34,536
Peru	211	168,042	9,308
Total	7,003	5,122,997	202,306
Lead-base bullion and bullion:			
Mexico, pounds	867,272	830,606	88,442
Lead—Pigs, bars and old:			
Canada	.....	1,100	33
Costa Rica	.....	114	4
Mexico	.....	2,539,682	182,749
Haiti	.....	258	9
Danish West Indies	.....	8,344	478
Chile	.....	4,799	240
Total	.....	2,554,297	183,513
Zinc ore:			
Spain	3,750	3,276,000	90,938
Canada	1,574	1,454,700	44,917
Mexico	13,557	9,078,563	488,704
Guatemala	36	32,000	949
China	61	62,261	3,839
Australia	3,384	2,121,612	127,297
French Africa	200	156,800	11,185
Total	22,562	16,181,936	767,829
Zinc in blocks, pigs, etc.:			
Costa Rica	.....	10,848	744
Panama	.....	2,189	306
Other British West Indies	.....	722	58
Cuba	.....	88,418	7,185
Mexico	.....	17,579	1,278
Haiti	.....	1,165	90
Dominican Republic	.....	1,043	57
Brazil	.....	118,779	12,107
Ecuador	.....	4,549	364
Total	.....	245,292	22,189
Zinc dust:			
France	.....	88,184	18,528
Japan	.....	98,738	23,054
Total	.....	186,922	41,582
Foreign Exports:			
Zinc dust	.....	45,254	11,339
Domestic Exports:			
Lead—Pigs, bars, etc.:			
Produced from domestic ore	.....	14,333,423	1,062,616
Produced from foreign ore	.....	644,073	29,185
Zinc—Pigs, bars, etc.:			
produced from domestic ore	.....	21,465,204	3,768,796
Produced from foreign ore	.....	10,917,865	1,070,261
Zinc plates and sheets	.....	1,152,659	267,860

American Ozokerite Mining

The American need for ozokerite has heretofore been largely met by imports from the mines in Galicia, Austria, but as the war in Europe has seriously affected ocean transportation, interest in the domestic supply of this material has been stimulated. The deposits of ozokerite in Utah, the principal ones in this country, were visited by H. M. Robinson, of the United States Geological Survey, in September, 1914.

As described in the resulting report, the ozokerite is found in fissures and brecciated zones, principally in the Wasatch formation, of Eocene age. Tests made by the Bureau of Mines on six samples show their specific gravity, solubility, melting point and the fractional distillates they yield, and it is suggested that by boiling crude ozokerite with strong denatured alcohol a commercial separation of the refined product ceresin may be made.

Ozokerite is a nonconductor of electricity and is extensively used for insulating. Candles made from ozokerite have superior qualities. Much of the ozokerite mined is converted into ceresin, a highly purified product which is used to replace or mix with beeswax and has a variety of other uses.

A copy of the report—Bulletin 641-A—may be obtained free on application to the Director of the Geological Survey, Washington, D. C.

New President of Colorado School of Mines

Howard C. Parmelee, for 17 years active in scientific research in Denver and throughout the country, and widely known as a chemist, was elected president of the Colorado School of Mines at Golden, Aug. 10, 1916, succeeding William B. Phillips. He was chosen unanimously from among seven names considered by the board of trustees.

He is president of the Colorado Scientific Society, and for several years has been editor of the *Mining Reporter.* He is editor, also, of the *Western Chemist and Metallurgist,* and Western editor of *Metallurgical and Chemical Engineering,* published in New York.

Mr. Parmelee received the degrees of B. S. and A. M. at the University of Nebraska. He was chemist for the Union Pacific at Omaha for several years before going to Denver, in 1899. His services there include connection with the Globe and American Smelting and Refining companies.

He was one of the organizers of the Teknik Club of Denver and the Western Association of Technical Chemists and Metallurgists. He was secretary of the latter organization for five years.

He holds membership in Sigma Xi, honorary engineering fraternity; Tau Beta Pi, honorary engineering fraternity, Colorado School of Mines; Alpha Chi Sigma, chemical fraternity, University of Colorado; and the American Institute of Mining Engineers. Mr. Parmelee will assume the duties of president Aug. 15.

Michigan College of Mines Second Reunion

The second reunion of the alumni of the Michigan College of Mines, making the 30th anniversary of the founding of the college, was held at Houghton, Mich., on Aug. 8, 9 and 10.

Notwithstanding the unusual activity in metal mining at this time, which might have been expected to keep many from attending, very few were so detained and the attendance was gratifying, amounting to upward of 400.

The alumni themselves had a voice in making the program, and three days of perfect Lake Superior weather made it possible to carry out the plans according to schedule.

On Tuesday morning all registered in the official register of the alumni, a loose-leaf book presented several years ago by the Chicago Club and first used at the Panama-Pacific Exposition. Tuesday afternoon was given over to a general get-together on the campus, inspection of buildings and equipment and the renewal of acquaintances between men some of whom had not met for eight years. Also, that afternoon President and Mrs. McNair tendered a reception to visiting graduates and their wives. On Tuesday evening a smoker was held in the college gymnasium, during which an informal program of stunts was given. The evening opened with an address of welcome by James McNaughton, general manager of the Calumet & Hecla, and a member of the board of control of the college.

Wednesday, the second day, started with a parade organized according to the various clubs of the Alumni Association and led by the Calumet & Hecla band. A buffet lunch was served at noon in the college gymnasium. The afternoon was filled with a formal program of speeches, in which M. E. Wadsworth formerly president of the school, led off with a most interesting history of the early days of the college. A business meeting of the Alumni Association then followed, and in the evening the class dinners were held at various places in Houghton, Hancock and Calumet.

On Thursday, everyone was given the choice of two sight-seeing trips around the copper country. One took in a number of the mines between Houghton and Mohawk, while the other included the Ahmeek mill and the newer installations of the Calumet & Hecla at Lake Linden. Among these the dredge, regrinding, leaching and electrolytic plants were of particular interest, shown by the fact that two-thirds of the crowd selected this trip. The reunion closed with a dance at the gymnasium, Thursday night. Soon after, several hundred happy alumni were on their way to their jobs again, scattered from Maine to Arizona, Canada, to Italy and Honduras, vowing to return again five years later.

Chief Consolidated Costs

The report of the Chief Consolidated Mining Co., Tintic district, Utah, shows that there were total shipments of 42,144 tons of ore yielding, after the payment of transportation, smelting and sampling charges, $742,058. Average gross value per ton was $30.08, while the cost of smelting, freight, sampling, etc., amounted to $12.47, leaving a net average value per ton of $17.61. Total operating costs for six months amounted to $276,266. The cost for machinery and equipment was $14,996; for construction, $8,320; and other expenses and dividends bring the total up to $533,686. Total receipts amounted to $915,275, leaving a net balance on July 1, 1916, of $381,589.

Excessive Tax Assessments

Declaring that the courts will grant relief against a palpable overvaluation of mining property for the purpose of taxation, the Washington Supreme Court has decided that where gold and silver lands were purchased for about $25,000 and money was spent for development work, a valuation for a year in which a profit of $50,000 was derived should be reduced from $80,200 to $50,000, and valuations for succeeding years during which there was either a loss in operations or no development should be reduced from $80,000 and $40,000 to $10,000, exclusive of the value of improvements, $1,500. (First Thought Gold Mines vs. Stevens County, 157 Pacific Reporter, 1080.)

Correspondence and Discussion

Proposed Change of Mining Code

In response to your recent invitation for criticisms of the program of the Mining and Metal Society of America for the reconstruction of the United States mining code, I beg leave to offer the following remarks, necessarily cursory, as an adequate discussion would occupy several issues of the *Journal*.

Primarily, I disagree with the proposal for the separation of all public lands into mineral and nonmineral classes. Aside from the expense and delay incident to any classification at all, the practical results possible to achieve in this line are bound to be most inadequate. A geologist, without the use of prospecting tools, is unable to classify land accurately even for coal and regularly bedded deposits, while for other classes of minerals the difficulties of classification, by inspection alone, are still greater. Then, too, what one generation may consider worthless may later become valuable mineral—for instance, the carnotite beds of Colorado and the porphyry copper of Bingham.

But why need we bother with classification, when there is available the simpler system of the Napoleonic code, by whose operation the separation of mineral rights from surface ownership has long been successfully practiced in Latin countries? For our Federal Government to adopt this system, it would be necessary only to reserve all minerals remaining unclaimed in the granting of future patents to the national domain and to abolish the freehold system for mining land in favor of the leasehold. The latter system is considered the more stimulating to development, the more productive and the more equitable to society.

As to the size of a claim, the proposed 40-acre unit seems entirely too large. Its dominant advantage, of conforming to the Public Land Survey lines which are based on the 640-acre section, can be retained equally well by using any smaller unit obtained by dividing 640 by a multiple of two. It simply involves the fixing of a few more corners. Though there is much in favor of the Mexican unit of 1 hectare (2½ acres), it is likely the Peruvian units of 2 hectares (5 acres) for metallic and 4 hectares (10 acres) for nonmetallic minerals would be small enough for the convenient location of the minimum necessary area.

In the four proposals that the number of claims allowed to one locator should be unlimited, that no discovery of mineral should be required for validity, that all new claims should be speedily registered at the nearest Federal land office, and that no more lateral rights should be granted, I heartily concur.

The existing law, by allowing claims to be held by the locator's own statement of the work, performed puts a premium on perjury; and unless some more efficacious system of inspection can be established than the present one, the work requirement had better be abolished altogether in favor of the areal tax of Spanish America. If claims could be held by work alone and the excess of expenditure on one claim in one year applied without limit over other claims and future years such privileges would almost certainly be gravely abused. Such a law would allow any mine on which a million or so dollars had been spent to lock up a whole county from prospectors for an indefinite time ahead. The New York proposal goes as far in one direction as the decree of General Villa, which prescribed that there must be a continuous active work on every hectare held, went in the other.

Our adoption of the leasehold system for minerals need not necessarily mean a permanent Federal ownership such as prevails in Spanish America, whose nations have smaller territories and more centralized government than the United States. Indeed, leasing is the favorite system of exploiting the minerals of the Australian States.[1] As soon as any state had amended its constitution so as to separate mineral and surface ownership and prohibit the further alienation of public minerals, the privately located Federal mineral rights within its borders could be transferred to it. The transference of a private mining claim from Federal to state ownership would be the equivalent of the present patenting procedure and might well be done within the maximum limit of seven years, from date of location, as is proposed.

The suggested annual areal tax of $7.50 per acre ($300 for 40 acres) appears excessive. Would not the rate of $5 per ecre be sufficient? In confining itself to metallic minerals the proposed law seems needlessly narrow, and I prefer to include all minerals within the limits of one uniform code, as Peru does. A convenient scheme would be to divide all minerals into two classes. In the metallic class could be included all underground metallic minerals, and in the nonmetallic class could be included metallic placers and all surface or underground deposits of nonmetallic minerals except the common earths, clays, sands and stones, which would accompany the surface ownership. Then the nonmetallic class could be legally handled just like the metallic class, except that its allowable size of claim could be doubled and its annual work (or tax) requirement per acre located could be halved.[2]

With my proposed leasehold system in effect, prospectors would in the future have to acquire from the landowners whatever surface rights they needed for mining. The public lands could be sold to miners, in the size desired, at the same rate given to farmers, but to facilitate the acquirement of private lands, all mining enterprises should be given the same right of eminent domain that is now enjoyed only by public utilities, as in Latin countries.

In conclusion, I would criticize the proposed law as more empiric than scientific in that it sets out to patch up the baseborn mining code of 1872 rather than to con-

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[1] "Mineral Laws of Australasia," by A. C. Veatch, Bulletin, United States Geological Survey, No. 525.

[2] "Natural Taxation of Mineral Land," by the writer, Min. and Scien. Press, November, 1915.

struct an entirely new code based on the correct relation of mankind to the earth in a democratic industrial society and the experience of other nations in handling their mineral lands. The whole proposed law also seems too much in awe of that bugaboo of the conventional lawyer, ancient "vested rights," which are too often but actual wrongs, that canker society at its vitals. Should not a new code hew to the line of scientific equity and refuse to continue hoary injustices or absurdities any longer than is expedient for all concerned? In this way we may continually harmonize our law with our social development and avoid any such destructive internal convulsion as we now behold with horror in Mexico.

In my new book on Mexico,[3] there is explained a plan for the recovery (through progressive taxation) by the nation of its rights to nonmetallic minerals, which were mostly alienated by the venal mining law of 1883. All such minerals, not actually held for mining purposes, would thus in a few years revert to the government, and the whole unoccupied mineral area of Mexico would again be open to the prospector. R. B. BRINSMADE.

St. Louis, Mo., July 31, 1916.

How to Sell a Mine

Your reference to this interesting subject in the *Journal* of July 29 is, as you say, just as pertinent as when first published in 1908, and from many letters received it is evident that your suggestions have been acted upon. I frequently receive communications asking if such and such a mining proposition would be of interest to my clients, from owners or operators who have undoubtedly obtained my name from the professional directory in the *Journal*.

While this may place the vendor in touch with some one who is willing to buy or develop property, there is another point of equal or greater importance; that is, a description of the property offered. An intelligent description of that for which the applicant is trying to secure capital is the last thing he thinks of securing and the first for which the capitalist asks.

It may be discouraging to the man with a mine to sell to read the reports of some of the larger companies telling how many hundred propositions they turn down annually, but should he make inquiry, he would probably find that 75% or more had been declined because insufficient data accompanied the report to enable the purchaser to form an intelligent idea of what the owner wished to sell.

While I have kept no record of these points, it is my impression that less than half the reports submitted to me are accompanied by any maps at all; property maps are not rare but full mine maps are so rare as to be interesting and cause one to hunt diligently through the accompanying reports for some indication of what had been found in the various openings shown. And when it comes to a complete sample map of a property that is for sale, this is so very rare indeed that when it does come an engineer experiences the sensation of having made a find even before he has had an opportunity to examine the figures in detail.

If the minds of owners could only be opened to the realization of the fact that a small amount of money spent in careful sampling, assaying and recording, produced much more satisfactory results than a greater amount spent upon a verbose, pseudo-geological report by an "expert" signing his name with B.S., M.E., member A.I.M.E., etc., etc., there would not be so many disappointed owners leaving New York after a vain endeavor to secure interest in their mining ventures.

The report by the owner or practical miner is generally about as useless. A man may know his mine from top to bottom and from end to end; he may know where to find new orebories and know where they are absent, and yet, if unable to tell in simple language just what he has and what he knows, his knowledge will be of little use in selling his mine.

When an owner is told what it lacking, he is apt to feel that his integrity has been brought in question and can seldom be made to see that it is necessary or advisable to go to the expense of acquiring and furnishing information which the purchaser would have to duplicate in the event of the latter becoming interested.

This statement applies not only to the owners of prospects, small mines and to men of limited business experience, but to men of large affairs and owners of large mines. The information asked for by the purchaser is not expensive to secure, and is of as much benefit to the owner as to the purchaser.

Late in July there came to New York the representative of a gold-silver-copper property in the Southwest. The owners, who are known to a great many of your readers personally or by reputation, had made a report, the most interesting part of which was a small mine map showing certain areas mined out, with the tonnage produced from certain stopes and the smelter returns from those shipments.

As to the value of the material remaining in the mine, it was stated that 900,000 tons of $8 to $9 was developed, but not a single figure or drawing was given to enable the purchaser to form an idea, intelligent or otherwise, as to where such ore existed or how the value was determined.

The owner's representative, the superintendent of the mine, could throw no light on the subject. "The owners, whose reputation you know to be unimpeachable, have made this statement, and I consider that quite ample for securing the attention of financiers," was about all that the representative could say. The price was in the millions, several of them. The last heard it was going the rounds and meeting with the usual reception for lack of information and yet it may be something worth several millions in spite of the handicap given it by its owners.

You have told some of your readers where to look for buyers, please ask them also to tell what they have to sell. And the easiest, cheapest and best help in this direction is that offered by a complete sample map of the property.

Westbury, L. I., Aug. 2, 1916. F. F. SHARPLESS.

Kennecott Copper Production

The Kennecott Copper Corporation produced 10,750,000 lb. of copper in July, 1916. The production for the last ten months, including July, is given in the accompanying table.

	Lb.		Lb.
July	10,750,000	February	9,750,000
June	10,500,000	January	10,000,000
May	10,500,000	December	10,500,000
April	10,500,000	November	10,000,000
March	10,150,000	October	10,000,000

[3] "El Latifundismo Mexicano; su Origen y su Remedio," published by Federal Department of Fomento, Mexico City.

Editorials

The Threatened Railway Strike

During the last week the nation has been threatened by a combined strike of the railway engineers, firemen, conductors and brakemen, that would tie up the traffic of the entire country. The four brotherhoods stated plainly that it was their intention to do just that thing. This made a national emergency of the matter, and it was taken to the President of the United States, who intervened for the reason that it had become a national matter. Up to the time of our going to press, Wednesday afternoon, no solution has been reached.

The demands of the railway men crystallize in an eight-hour day and time-and-a-half for overtime. The existing organization of railway divisions does not permit of an eight-hour day and no overtime. Both the men and the managers know that the crux of the matter is the "overtime." The labor leaders see dangling within apparently easy grasp the acme of their present hopes and desires—namely, two days' pay for one day's work. The railways cannot stand any such thing with their present limitations. Here is where the interests of the public come into consideration.

The New York *Sun* put the case concisely and excellently when it said:

> Obviously, the eight-hour day means greater expense to the railroads; that spells higher rates for the public to pay. The treasuries of the carriers can pay out in wages no more than the public puts into them for transportation. Already the railroads have been crippled by regulation that limited their earnings on one side while it increased their expenses on the other. This has hampered their growth, impaired their service and restricted their usefulness to the public. Greater burdens must be offset by increased incomes; and the necessary revenues can be extracted from only one source.

This whole business is becoming well-nigh unbearable. Is a labor monopoly of 400,000 men, dominated by a few leaders, to be permitted to throttle the nation and jeopardize the interests of its 100,000,000 population? There has got to be some permanent settlement of this great problem, and it has got to be soon. When the four railway brotherhoods united in a common interest they directed their efforts toward the creation of a crisis, and the crisis has come.

Silver Price Fluctuations

The price of silver, which reached a maximum this year about the middle of May at 77⅛c. in New York and 37d. in London—the highest for many months—fell off gradually but with some variations to 63c. in New York about the middle of June. With various fluctuations it reached 61c. in New York and 30⅛d. in London on July 11, and has since varied between 61 and 63¼c. in New York, with no marked tendency visible. The demand for silver from the European mints which sent the price up in May was satisfied for the time being, though it is by no means at an end; at any rate the pressure to buy became less urgent, and supplies were more plentiful. There is every reason to believe that mint buying will be renewed before long, and that it will be more or less continuous for some time. The possible approach of peace will not stop it; indeed it may increase the demand when Germany and Austria may come into the market as free buyers. Both nations will probably need silver currency in large amounts.

The release of the mint buying pressure had something to do with the fall in price of the white metal, but another cause was active. The situation in the Far East—usually a heavy taker of silver—has been anomalous. India has not been a liberal buyer in the London market for some months; while in China the usual conditions have been reversed. Owing to the disturbed conditions in that country silver accumulated in the treaty ports, where it had been sent for safety, less being required for business purposes. At the same time the moratorium on debts granted by the government decreased the quantity required for current use. The Chinese sought to utilize the supplies thus accumulated and for the past two months China has been a seller and not a buyer of silver. Statistics do not show the exact quantity taken, but good authorities estimate that it has been not far from 33,000,000 oz.—13,000,000 oz. going to Russia and 20,000,000 oz. to India; the latter quantity, of course, being a direct deduction from the usual purchases in London.

This quantity of silver, it is thought, is near the maximum which China can spare, and it may not be long before buying for that country may begin. Much depends upon political conditions, but the circulating medium must be down to a low point now, and any revival in business activity will demand a large increase. The lower current prices in London serve to encourage Indian buyers, who have watched the market very closely and seem to come in on every downward reaction. Renewal of mint buying, which is possible and even probable at any time, may be expected to sustain or advance prices. Demand in this country for silver for use in the arts, especially for the silver salts used in photography, has been very good, much better than usual. Supplies are not overabundant, there being a considerable decrease in the quantities sent from Mexico, which has been only partially made up by the moderate increases in the United States and Canada. There is no pressure to sell silver, though there is sufficient disposition to supply the market with all that it will take. India is fairly prosperous and will turn to London again as soon as China has sold all she can spare.

So far as can be foreseen no important fall in prices is at all probable, and any considerable change will be in the other direction. The present speculative changes of a few cents at a time may and will continue as long as there is an opportunity to deal and a degree of uncertainty about the future. We do not anticipate a return to the high prices of May; much less to the level below 50c. per oz. which was current a year ago. Whether the approach or conclusion of peace may bring about radical

business disturbances which would affect silver as well as everything else is a question on which there are widely divergent opinions. At present that seems too far in the future and too uncertain to affect the present position seriously.

Sampling of Spelter

In the *Journal* of July 8 we discussed the sampling of spelter, indicating the difference in the points of view of the producers and the consumers, especially the brass makers. We remarked that "the specifications of the American Society for Testing Materials require as to sampling only that *at least* 10 slabs shall be drawn." This was technically in error, for at a meeting of that society about the end of June, its specifications were amended so as to require that 10 slabs *shall* be drawn at random. Our editorial was written a month or more previous to its publication, and when it was published the report of the society's meeting had not come to our attention. It is probable that the matter came before the society in the same way that it came before us, and the society was quick to make its specifications precise in this respect.

In the new specifications the contention of the brass maker is upheld, and the producer making a guarantee of spelter is now required practically to insure that every slab will be within the specified limits. An ordinary carload—50,000 lb.—of spelter comprises 820 to 960 slabs, and in drawing only 10 thereof—2% or less—the idea of average composition is thrown to the winds. The only safety of the smelter will be what we suggested; namely, to remelt his spelter, unless it is being produced from an unusually pure and uniform ore. The producer of electrolytic spelter will have less trouble in this respect, for his cathodes have to go into a large melting furnace anyhow. Some producers of electrolytic spelter have already commented to us upon the noteworthy uniformity of their product.

The American Society for Testing Materials did another important thing at its last meeting; namely, the creation of a new class of spelter—"Selected"—coming in between Prime Western and Brass Special. This was simply coming into line with a custom that had developed in the trade during the last 18 months, during which time there has been great discrimination among spelters according to their composition. In fact, the official classification has been largely disregarded, spelter of the superior kinds having been sold to a large extent by specific analysis rather than by the official classification.

There are at present more disputes with respect to the sampling of spelter than in normal times, owing to the extraordinary trade conditions. Manufacturers were lately taking in spelter at 16c. per lb. under contracts made several months ago, the price for spelter having in the meanwhile declined to about 8c. per lb. If the manufacturer had purchased his spelter simply to cover orders previously taken for his own goods the cataclysmic decline was of no great consequence to him, although his failure to gage market conditions better might have been mortifying. If, however, the manufacturer had overbought his requirements—which to a considerable extent has proved to be the case—he was confronted by a stupendous, and possibly calamitous, loss. That has been, therefore, a strong motive for buyers to get out of their contracts if they could and naturally they have held sellers to the strict letter thereof. If a seller fails to make shipment at the specified time, his contract vanishes. This has been a feature of some of the foreign business, in which connection shipments have been hampered for a long time. The wise seller has, therefore lately been especially fore-handed. If he had contracted to ship some spelter in July, he endeavored to get it off in June and thus make sure of it.

In domestic business, and especially in business in brass special, the failure of a shipment to come within the guaranteed limits is seized immediately by the buyer as a sound reason for rejection and abrogation of the contract. An offer by the seller to replace the lot is not entertained. Of course, all business in spelter does not stand upon such a loose footing. In most cases the relations between buyers and sellers are amicable and are founded upon mutual good feeling and the desire to continue to do business with each other during years to come. In many cases, also, the failure of a shipment to come within the guaranteed limits is stipulated contractually to be not a ground for rejection, but simply for penalization according to a scale. It is, perhaps, a little unfortunate that the American Society of Testing Materials should have formulated a new rule at a time when market conditions were in such confusion and without giving adequate opportunity for discussion among producers and consumers, or rather among smelters and manufacturers, although both parties were represented on this committee by distinguished authorities.

The Proposed Copper Tax

Congress has not yet finished the making of the new tax law, and as yet nobody can say what it is going to be. The Senate evidently has made up its mind not to tax copper especially, being clearly impressed by the force of the arguments respecting the unfairness of such a tax. The latest idea of the Senate appears to be to levy a tax of 10% on the net profit in the manufacture of war munitions and a tax of 5% on materials entering into munitions. Thus both copper and cotton and many other things will be subject to a tax so far as they are used for munitions. The latter proposal embodies features that are both humorous and perplexing, and probably some of other kinds also.

The humorous feature is the realization that the proposal means a tax on cotton in so far as it enters into the manufacture of munitions. This excited the ire of the Southern senators, who had been not only complacent, but also eager, when the idea was to tax copper only. It makes all the difference in the world whose ox is being gored.

The perplexing features are the handicap that it puts on the domestic manufacture of munitions and the trouble as to how profits are to be determined. Looking at the first matter, copper sold to an American manufacturer of munitions will be taxed at the rate of 5% on the profits of its sale to munition manufacturers. The manufacturer will then be taxed 10% upon the profits of his business. But if the copper were shipped to Europe and there used in making munitions, it would escape all taxation. As one Republican senator expressed it, this is putting the "reversed English" on the protective tariff.

Looking at the other matter, how is the tax of 5% on the component parts of munitions to be determined?

According to one view, the miner, the smelter, the refiner and any middle man having to do with the business will each be subject to a tax on their profits. Thus also with cotton. But how is the copper miner or the cotton grower going to know whether his product is going into the manufacture of munitions or not, and in many cases how is he going to determine his profit? Another view, which appears to be that of the Finance Committee of the Senate, is that the only person or corporation to be taxed is the one that sells the copper or other products to the munition manufacturers. A natural consequence of this would be that the copper producers, like the cotton producers, would sell their product through brokers to the munition manufacturers, so that only the broker's profit would be taxed.

It is evident that a lot more thinking and tinkering has got to be done before Congress will be able to produce a workable excise measure upon the lines on which its thoughts are running.

BY THE WAY

Senator Sherman of Illinois is undoubtedly a brave man. In the Senate on Aug. 14 he characterized Samuel Gompers of the American Federation of labor as a "public nuisance" and added, "There is no more tyrannical, outrageous injustice than that of labor leaders who live on the sweat of other people's brows." Fancy the temerity of a senator saying such a thing!

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Recent news dispatches have directed attention to the proposed purchase by the United States Government of the Danish West India Islands. As part of the purchase price this Government, it is said, is to relinquish whatever claims it may have in Greenland in favor of Denmark. It is of interest to note that there is small possibility of mineral exploitation in the Danish West Indies, while there may be some of importance in Greenland. Like Alaska, Greenland may some day become a source of mineral wealth.

⁂

A taciturn Hungarian drill runner, cordially disliked by the other miners, was given a one-man drill and a heading to himself by the discerning boss. But even there he could not escape the results of his unpopularity. One day some bright mind conceived the idea of filling the oil chamber on the Hun's drill with oil of asafetida while the Hun was bringing in a stull. Thereupon starting up his drill the asafetida quickly contaminated the drill exhaust, filling the heading with staggering fumes of rotten eggs. Presently the foreman on his morning round met the Hun on his way to the shaft with the drill on his shoulder. "Well, what's the matter with you now?" he growled, eyeing the drill sharply. "D——— drill sick," was the disgusted reply, "somebody give him poison."

⁂

The New York *Sun* was in its best form when it wrote as follows about matches: We affirm that never since the invention of lucifers have the matches furnished to a free and independent people been so unfit, useless and dangerous as those that are in circulation under the misleading title of "safety" at the present moment. We do not refer to the waxed-paper abominations designed to burn the interior of the user's hand; these are no worse than they always have been, because deterioration in their quality and increase in the peril consequent on their use are impossible. We have in mind the common wooden sticks, brown tipped, which are alleged to strike only on the box and which as now compounded won't strike anywhere. Their sticks are cut across the grain or else so crushed in preparation that they have no strength. The composition which habit promises will ignite them is of a granite consistency and tears the prepared paper from the side of the box. The inflammable material grows constantly less potent; the foiled striker scratches again and again with no result until in desperation he exerts his strength, acquires a light and has the pleasure of seeing the broken torch burn a hole in his coat or trousers or set fire to the papers on his desk. We expect to be told that the war has absorbed all match-head materials and that the manufacturers cannot get the stuff they need to make a satisfactory mixture. But the war had not necessitated the introduction of crossgrain sticks, knotholes or machinery that breaks the wood half way through before the ultimate consumer is permitted to endanger his life with the completed article. Nor is the war responsible for the ingenious device of affixing the chemical compound to the stick in a manner that allows it to drop off before the match is taken from the box or when it is applied to the striking surface. Probably the Gulf Stream must bear the burden of this. It is guilty of everything that is not charged to the war.

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Safety First

By John H. Carroll

The piston man in eighty-four,
Crimped caps between his teeth,
He's gone; you won't see him no more,
We're buyin' him a wreath;
When we said he'd get hurt some day,
He only laughed and cursed,
He'd still be walkin' round if he'd
Remembered "Safety First."

Mike Stark jumped off a movin' train,
Stepped on a pile of steels.
He lost his footin', down he came,
Fell underneath the wheels.
They had to cut a leg and arm,
He's done for now, for good,
But he'd a-never come to harm
Had he guarded as he should.

A Cousin Jack named Jimmy Ross
Was samplin' in a raise,
He, careless, put a board across
And said, "I hope she stays,"
And then away up near the top,
He loosed a bloody stull.
It was a ninety six-foot drop—
He smashed his bloomin' skull.

The raise-man, 'cross in thirty place,
Forgot to holler fire.
He'd surely got us in the face
If he'd been three feet higher,
The cut hole didn't throw much muck,
And so we got away;
And now we thank our streak of luck,
That we're alive today.

The fellows who've been thru the mill,
A workin' underground,
Say "Watch yourself," no others will,
They've tried—that's what they've found;
There's lots of things can happen,
But the commonest and worst,
Is to get yourself caught nappin'
And forget that "Safety's First."

NEW PUBLICATIONS

NATURAL GAS RESOURCES OF PARTS OF NORTH TEXAS. By Eugene Wesley Shaw and George Charlton Matson. With Notes on the Gas Fields of Central and Southern Oklahoma. By Carroll H. Wegemann. Pp. 129; illus. Bull. 629, U. S. Geological Survey, Washington.

ABSTRACTS OF CURRENT DECISIONS ON MINES AND MINING, FROM OCTOBER TO DECEMBER, 1915. By J. W. Thompson. Pp. 74. Bull. 118, U. S. Bureau of Mines, Washington.

MINERAL RESOURCES OF MICHIGAN, WITH STATISTICAL TABLES OF PRODUCTION AND VALUE OF MINERAL PRODUCTS FOR 1914 AND PRIOR YEARS. With a treatise on Michigan Copper Deposits by R. E. Hore. Prepared under the direction of R. C. Allen. 6¼x9, pp. 359, illus. Publication 19, Geological Series 16. Michigan Geological and Biological Survey, Lansing, Mich.

INSTRUMENTS FOR RECORDING CARBON DIOXIDE IN FLUE GASES. J. F. Barkley and S. B. Flagg. Pp. 60, illus. Bull. 91, U. S. Bureau of Mines, Washington.

THE ANALYSIS OF NONFERROUS ALLOYS. By Fred Ibbotson and Leslie Aitchison. 5½x8¾, pp. 230, illus. Longmans, Green & Co., New York.

The authors, who are in the metallurgical department of Sheffield University, have aimed to produce a book which shall at once be of assistance both to the student and to the practicing analyst. It is the most modern textbook we have seen in applying modern physical chemistry to the discussion of the analyst's problems and seems well worthy of a place in the chemists library.

PATENTS RELATING TO OIL-FLOTATION PROCESSES. By R. S. Lewis and O. C. Ralston. Pp. 56, Bull. 8, Utah School of Mines, Salt Lake City, in coöperation with the U. S. Bureau of Mines.

A list of U. S. patents that have been granted, pertaining to flotation processes of ore concentration. No foreign patents are included, but since most foreign inventors have taken out patents here, the list is fairly complete.

THE CANADIAN MINING MANUAL, 1915. Edited by Reginald E. Hore. 7x9½, pp. 432, illus.; $2. Mines Publishing Co., Toronto, Canada.

The avowed object of this publication is to carry to other countries reliable information concerning the mines and mineral resources of Canada. The editor of the "Canadian Mining Journal" is peculiarly well fitted for such a task and, as confidently anticipated, the book is found to do the editor and his collaborators credit in achieving the apparent success of their object. The work gives statistics of production, mining company dividends and lists all the operating mining companies alphabetically. The main features of mining in Canada are covered by nontechnical descriptions easily understood by the layman.

LEAD AND ZINC DEPOSITS IN ONTARIO AND EASTERN CANADA. By W. L. Uglow. Twenty-fifth Annual Report of the Ontario Bureau of Mines, 1916, Part II. Pp. 56; with maps. King's Printer, Toronto.

The demand for metals created by the war has drawn attention to the extensive undeveloped resources of Ontario and has resulted in legislation by the Canadian government for the encouragement of the lead and zinc mining industries. The present report is based upon an examination made by the writer of mineral properties west of Quebec City and east of the western end of the Sudbury basin, special attention being given to occurrences in the southeastern part of Ontario. As the zinc and lead deposits of Eastern Canada are of different well marked types, a genetic classification according to mode of origin has been adopted. The report draws attention to certain areas which deserve a more thorough exploration than they have received, especially the deposits along the north shore of Lake Superior, which are regarded as particularly worthy of investigation on account of the presence of silver. At present mining operations for lead and zinc are being conducted in only three localities in Ontario and Quebec. The only market for the product of these mines is the electrolytic refinery at Welland, Ont., operating on a small scale. The lead smelter of the North American Smelting Co. at Kingston, Ont., has been idle for three years, although it is reported that it may shortly be blown in again.

THE METALLOGRAPHY AND HEAT TREATMENT OF IRON AND STEEL. By Albert Sauveur, professor of metallurgy and metallography in Harvard University and the Massachusetts Institute of Technology. Second Edition, revised and enlarged. 7x10½ in.; pp. 486; illus. Sauveur & Boylston, Cambridge, Mass.

The sale of two impressions in less than three years is not the only indication of the appreciation with which the first edition of this book was received. Anyone accustomed to visit metallographic laboratories, either in iron and steel works or at colleges, has learned to expect to see there a copy of Professor Sauveur's book always ready at hand; those who discuss the subject with the men practically engaged in the works' laboratories hear it quoted more often than any other book on the subject. The reason for this is not difficult to find: It is the only book that attempts to cover comprehensively both the manipulation and the theoretical side of metallography; it deals at length with the apparatus and manual operations of the art; it is written in language easily understood by those not yet versed in the subject; it is comprehensive, but without giving to any part of the subject more space than its practical importance warrants. Many men are now successfully practicing the art without any more training for it than a good general education, some experience in iron or steel works' laboratories and a diligent study of Professor Sauveur's book. It thus successfully reaches the ideals which the author had for it and expressed in the preface of the first edition.

The second edition is a material advance over the first one. In the author's own words, "It was to be expected that even after so short a period as three years there would be need of a revised edition that recent progress might be put on record and a more faithful picture offered of its present status." Thus much new matter has been added to every chapter of the book with the exception of the last four, namely, Constitution of Metallic Alloys, Equilibrium Diagram of Iron-Carbon Alloys, the Phase Rule, and Nomenclature. Under the headings "Apparatus," "Manipulation" and "Heat Treatment" the results are given of many recent discoveries and the subject matter has been greatly amplified and altered. Altogether the book has been increased about 20% in size, the equivalent of nearly 100 pages.

Those who have found the first edition useful may rely upon finding the second one still more so, even though they may possess a copy of the first issue.

NEW PATENTS

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

DRILL ATTACHMENT for Drilling Machines. Henry J. Smith, Florence, Colo. (U. S. No. 1,191,542; July 18, 1916.)

DRILL-OPERATING MECHANISM. Joseph D. MacDonald, Butte, Mont.; Frank C. MacDonald, administrator of said Joseph D. MacDonald, deceased, assignor of one-half to Cathrine MacDonald and one-half to Frank C. MacDonald, San Francisco, Calif. (U. S. No. 1,192,657; July 25, 1916.)

FIRE BRICK and Method of Making Same. Sven H. Nordin, Tacoma, Wash. (U. S. No. 1,192,099; July 25, 1916.)

FLOTATION—Process of Concentrating Metallic Ores by Flotation. Homer T. Yaryan, Toledo, Ohio. (U. S. No. 1,191,053; July 11, 1916.)

FUEL — Apparatus for Feeding Finely Divided Fuel. Charles Longenecker, Springfield, Mass., assignor to Quigley Furnace and Foundry Co. (U. S. No. 1,191,203; July 18, 1916.)

FURNACE—Grate Mechanism. James A. Bow and Peter Thill, Great Falls, Mont. and Archer E. Wheeler, London, England. (U. S. No. 1,191,272; July 18, 1916.)

FURNACE BINDING. James A. Bow and Peter Thill, Great Falls, Mont., and Archer E. Wheeler, London, England. (U. S. No. 1,193,109; Aug. 1, 1916.)

FURNACE CONSTRUCTION. James A. Bow and Peter Thill, Great Falls, Mont., and Archer E. Wheeler, London, England. (U. S. No. 1,191,271; July 18, 1916.)

GARNET—Process of Utilizing the Waste Products of Garnet Works. John Davenport, Brighton, Mass. (U. S. No. 1,192,394; July 25, 1916.)

GOLD EXTRACTION—Method of Extracting Gold. Albert W. Smith, Cleveland, Ohio. (U. S. No. 1,193,197; Aug. 1, 1916.)

HOT-BLAST APPLIANCE. Chester A. Orr, Cleveland, Ohio. (U. S. No. 1,192,102; July 25, 1916.)

MINE-SHAFT GATE. Frank P. McClain and John A. Futcher, Rillton, Penn. (U. S. No. 1,191,806; July 18, 1916.)

MOLD—Ingot Mold and Feeder. Bloomfield H. Howard, Aspinwall, and Ernest J. Turner, Pittsburgh, Penn. (U. S. No. 1,192,425; July 25, 1916.)

PHOSPHATES—Treating Phosphates. Christopher G. Memminger, Lakeland, Fla., assignor to Coronet Phosphate Co., New York, N. Y. (U. S. No. 1,192,545; July 25, 1916.)

PLACER MACHINE. Herman Fesenfeld, San Diego, Calif., assignor of one-fourth to K. L Kidd, one-fourth to C. T. Davenport, and one-fourth to A. B. Bowman, San Diego, Calif. (U. S. No. 1,193,248; Aug. 1, 1916.)

ROASTING—Rabble Arm. Harry H. Stout, New York, N. Y., assignor to General Chemical Co., New York, N. Y. (U. S. No. 1,191,848; July 18, 1916.)

SAMPLING—Apparatus for Sampling Ores. Fredrick O. Collar, Ashtabula, and Herbert E. Wetherbee, Cleveland, Ohio, assignors of one-half to Benedict Crowell and Charles B. Murray, doing business under the firm name of Crowell & Murray, Cleveland, Ohio. (U. S. No. 1,192,990; Aug. 1, 1916.)

PERSONALS

J. B. Tyrrell has been at Prince Rupert, B. C.

H. P. Henderson left New York on Aug. 16, for a brief visit to Cuba.

S. H. Dolbear, of San Francisco, is spending a few weeks in Eastern centers.

N. R. Plate has returned to New York from a four-month business trip abroad.

J. V. Bowman has accepted a position as chief chemist for the Andes Copper Co., at Chanaral, Chile.

Edwin S. Berry will undertake independent consulting mining engineering in New York after Sept. 15.

W. H. Wright, of the Malm-Wolf Co., sailed from Seattle on July 3 for Alaska, where he will examine placer properties.

Chester W. Washburne has opened an office as consulting geologist in oil, gas and coal work at 66 Liberty St., New York.

Charles J. Gadd has been appointed chief engineer for the Lebanon plant of the American Iron and Steel Manufacturing Co., at Lebanon, Penn.

R. W. Leonard, formerly chief of the engineering staff of the Cerro de Pasco Mining Co., left the property about the middle of July for the United States.

George T. Snyder, chief engineer for the National Tube Co., at McKeesport, Penn., has been transferred to a similar position at the company's works at Lorain, Ohio.

Gen. Sir Alexander Bertram, of the Imperial Munitions Board, Ottawa, will shortly go West to inspect the copper mines in connection with the output of munitions.

A. G. Gullberg, superintendent of motive power for the subsidiary mines of the Calumet & Hecla Mining Co., Michigan, has just returned from a pleasure trip to Europe.

N. C. Whitten, recently foreman in the Anaconda's oil-flotation plant at Great Falls, Mont., has resigned to accept a position with the Cerro de Pasco Mining Co., in Peru.

René E. Hazard, a well-known mining engineer, joined the French army last February and is now acting as interpreter for two British regiments in department of the Somme.

Ward B. Perley, who has been assistant to President Farrell, of the United States Steel Corporation, has been made vice-president and general manager of the Canadian Steel Corporation.

Edward Thornton, superintendent of Bush-Baxter mine, Twin Buttes, Ariz., has been transferred to Silverbell as superintendent of the Imperial mine of the American Smelting and Refining Co.

W. F. John, who has recently arrived from Honduras, has been appointed mill superintendent of the Tough Oakes, in the Kirkland Lake district, in succession to Charles Randall, who has resigned the position to go to Cuba.

T. R. Hunt has accepted the the managership of the San Juan Mines (Argentine), Ltd., Mineral de Salado, Rodes, Provincia de San Juan, Argentina. He expected to sail from London on Aug. 1 to undertake his new duties.

Sir George T. Beilby, F.R.S., the chemist and metallurgist, Mr. Edward Dent, Sir Robert Hadfield, F.R.S., the metallurgist, and Sir H. Capel Holden, F.R.S., the electrical engineer, have been elected to the council of the Royal Society of Arts.

Dr. Milton Hersey, of Montreal, has returned from a trip through the West, undertaken at the instance of the Canadian Northern and Grand Trunk Pacific railways, to investigate the natural resources and industrial possibilities of the country.

Charles A. E. Blanchet, of Ottawa, has been appointed by the Canadian government as a Commissioner to inquire into the causes of unrest in the asbestos mining industry of Thedford Mines, Que., and the relations between employers and employed.

Andrew Weir, of London, is visiting the Pacific Coast oil region. It is possible that Mr. Weir's visit has some relation to the recent permit given by the Commission of Corporations, authorizing General Petroleum to issue new stocks and bonds.

Harrison A. Dunn is still in prison in the City of Mexico. The latest advices of the Department of State in Washington are that his trial is being pushed by the Mexican authorities, that the American representative in the City of Mexico is exerting every effort in Mr. Dunn's behalf and is hopeful of an early release. Mr. Dunn is reported to be feeling better, both metally and physically.

OBITUARY

Cuno John Daman, of the engineering department of the Anaconda Copper Mining Co., died on July 13, of pneumonia. He was a graduate of the Colorado School of Mines, 1913, and was recently married.

C. E. Miller, a lessee in the Dead Pine mine, at Victor, Colo., met with instant death on Aug. 2, in a manner that can only be explained circumstantially. He was being hoisted alone in the cage, and it seems that he must have fainted and fallen so that his head was crushed against the shaft timbers. He was 45 years old.

Robert Belcher, 32 years old, an oil operator, resident of Berkeley, Calif., was drowned in a creek in the high Sierra, 40 mi. out from Huntington Lake, Calif., on July 24. Belcher was in company with G. W. Lewis and H. U. Maxfield and son, of San Francisco and Fresno. The accident was caused by Belcher's horse slipping from the trail into the creek.

William Henry Hooper, 84 years old, died at Coloma, Eldorado County, Calif., on July 24. He was a native of Ohio and went to California in 1851, stopping at Coloma, the point of discovery of gold by Marshall in 1848. He made his home there continually since that time and after following mining for a number of years, later became a fruit grower. He is survived by four children.

Thomas J. Drummond, of Montreal, one of the most prominent representatives of the iron and steel industry of Canada, died on Aug. 5 at Castine, Maine, where he was spending the summer. He was born in County Leitrim, Ireland, in 1860, and came to Canada with his family in 1866. He entered business life as a member of the firm of Drummond, McCall & Co., iron and steel merchants, established by his brother, George E. Drummond, with whom he was closely associated in his subsequent enterprises. The firm established the Montreal Wheel Works, at Lachine, Que., purchased the Radnor forges, and extended the business, establishing blast furnaces and foundries in Nova Scotia, Quebec and Ontario. In 1908 the Drummond group of iron industries were consolidated under the name of the Canada Iron Corporation with Mr. Drummond as president. In 1909 he became president of the Lake Superior Corporation, retaining that position for several years. He was interested in many other enterprises and in 1908 was chosen president of the Montreal Board of Trade. He was an associate member of the American Institute of Mining Engineers and a member of the Canadian Mining Institute. For some time previous to his death Mr. Drummond was in ill-health and had been forced to give up many of his activities. He leaves two sons.

SOCIETIES

Calgary Institute of Technology—A School of Mining has been organized in connection with the Calgary Institute of Technology. W. A. Davidson, M. E., M. Sc., has been appointed head of the mining department. He is a graduate of McGill University and has had practical experience in connection with coal mining in Nova Scotia and Alberta and occupied the position of manager of the International Coal and Coke Co., of Coleman, Alberta. He will undertake the organization of technical instruction in mining through the medium of classes in the mining centers of the Province.

American Chemical Society, at its New York meeting, Sept. 25 to 30, will conduct a symposium on occupational diseases, presided over by Professor Charles Baskerville, head of the department of chemistry of the College of the City of New York. The subject is interesting and important as well as full of surprises. Housemaid's knee, for instance, which for many years has served as a subject for humorous comment, proves to be a frequent malady of miners. Statistics bring the information that trades carried on in the presence of much dust show a high death rate from diseases of the lungs. The biologist explains that dust is not only minute particles, but that the particles are usually surrounded by a watery envelope, and that clinging to this filament there may be micro-organisms.

The symposium will consider the chemical trades, prophylaxis in chemical industry, diseases incidental to work in aniline and other coal-tar products, cedar lumber, mines, explosives, and a general discussion by the leading authorities of the country. These will include Drs. W. Gilman Thompson, F. L. Hofman, J. W. Schereshewsky, G. P. Adamson, H. K. Benson, W. A. Lynott, Alice Hamilton and Mr. J. B. Andrews.

Editorial Correspondence

SAN FRANCISCO—Aug. 9

Miners' Day at the California State Fair is scheduled for Sept. 6. Four teams in life-saving contests and 12 teams in first-aid contests are a part of the program. The contests will be under the direction of the U. S. Bureau of Mines and the California Metal Producers Association. The demonstration will serve the double purpose of attracting attention to the methods of mine safety adopted in California since the establishment of the mine-safety department of the Industrial Accident Commission by the appointment of a mine inspector acting for the commission and the Bureau of Mines conjointly, and to the mining industry of the state in general. The state fairs held annually at Sacramento have been almost wholly, though not exclusively, devoted to agricultural and horticultural interests. The farmer and the manufacturer of farm implements have held the center of attention and the mining industry has taken a back seat. This has been largely due to lack of interest on the part of mining men and the inclination of the managers of the fair to cater to the farmer. For the past 25 years and longer the mining men of California have done little to advertise the industry and practically nothing to attract investment, until within the past two or three years. Investors in California mines came without invitation and were looked upon by some as interlopers who were endeavoring to rob the old-timers of the property they were holding. The reopening of old mines by investors from other states and of other countries in the last 15 years and the great lack of interest in mining displayed by the present generation of Californians have shown the owners of old mines long idle the necessity for inviting outside investors and the utter futility of depending upon Californian investment. The mine-safety exhibits and the physical demonstration of mine rescue and first aid, it is hoped, will induce a larger and more comprehensive exhibit of the products of the mines at the coming state fair. That is one of the purposes of the demonstration and that will be the result if a proper spirit of coöperation is shown by mining counties.

Additional Oil Lands in California have recently been secured by three of the chief operating and marketing companies, the Shell, the Standard and the Doheny interests. The Shell company has taken over a total of 13,500 acres in Ventura County under agreements with owners and leasers and will thoroughly exploit the land; a field department office has been established at Ventura in charge of B. H. Van der Linden, geologist and field manager; two new test wells have been started. The Standard has made direct purchase of oil lands in the Whittier field, formerly operated by the Canadian Pacific, adjoining the Standard's Murphy lease, consisting of 60 acres; there are about 20 producing wells on the property. In the Maricopa field, the Standard has acquired 26 producing wells under lease for a period of 25 years; this is the property of the M. J. and M. & M. Also 40 acres of the old Wellman lease has been secured, to be operated on a royalty basis of one-fifth of production, in addition to a cash bonus said to amount to $250,000; this land is near the Monte Cristo property, purchased some time ago by the Standard. E. L. Doheny is reported to have closed a deal for the purchase of 400 acres at Casmalia, near the Santa Maria field, at a price said to exceed $250,000. It is believed that the property will be offered to the California Petroleum Co. and the Pan-American Petroleum and Transport Co.

BUTTE—Aug. 10

Opening of Anaconda's Zinc Departments will be the most important event of the summer in Butte mining circles. The company has practically completed its 2,000-ton zinc-concentrating plant at the Washoe works at Anaconda, and its large new electrolytic zinc refinery at Great Falls. One section of the refinery will be put into service now but it is probable that the entire Great Falls plant will not be ready for operation before Oct. 15 as there has been some delay in securing some machinery. The opening of the new zinc department of the Anaconda company is another step toward putting Montana in the lead in the zinc-mining industry. It has only been in the last three years that the Butte & Superior company with its great Black Rock mine and uptodate flotation mill has come to the front as the greatest zinc-producing mine in the world. This was followed by the establishment by the W. A. Clark interests of the Timber Butte mill and the development of the Elm Orlu, another great zinc producer. The latest move by the Anaconda company however has carried the zinc industry in Butte forward another step for it will place Montana not only in the lead as a zinc producer but also as a zinc-refining state.

Reopening of Butte-Duluth is in prospect, after having been idle for nearly a year and a half. On Aug. 7 Judge McClernan signed an order directing Receiver Everett to lease this property in the eastern section of the Butte camp to Alfred Frank and associates for a period of five years. They are to start operations within 15 days of date of lease, increase capacity of plant to 500 tons a day before August, 1917, and are to pay the company 50% of the net proceeds and retain the other 50%. After Feb. 1, 1919, company is to be paid from net proceeds at least $7,500 every three months; failure to make these payments gives receiver right to declare lease at an end. Mr. Frank and associates have lately been operating the Ohio copper mine in the Bingham district, Utah, under lease as the General Exploration Co. He was formerly engineer for the Heinze interests and is thoroughly familiar with conditions at the Butte-Duluth. Under terms of lease he will expend from $50,000 to $100,000 in completing equipment and getting property in shape for operation. The plan is said to be to install a flotation process in place of the electrolytic process employed in the original plant.

DENVER—Aug. 9

Reduction in Tungsten-Ore Prices has been announced by the leading producing companies in Boulder County. The new schedule is $15 per unit for 60% WO_3 with a scale sliding down to $9 per unit for 1% ore. Miners of the state are urging upon officials of the Colorado Metal Mining Association the desirability of Congressional action looking to the placing of a tariff on importations of tungsten, adequate to encourage continuance of mining for this metal. Directors of the association met in Denver, Aug. 9, and considered proposed legislation to be presented to the next session of Congress.

A New Tungsten Area in Colorado is suggested by the finding of a strong vein near Alma in Park County. On the J. G. Blaine, an old claim in Buckskin gulch owned by Harold Koontz, of Denver, the lessees Dan O'Connell, J. J. Shuck, J. E. Dollison and Alexander Davidson have opened a shoot rich in hübnerite. This mineral was identified three years ago by Mr. Dollison, the local assayer at Alma, in ore then being mined from this vein for silver. The same vein has been opened on the Esmeralda claim nearby and prospectors claim they have traced the occurrence of the mineral through Mount Bross and Mount Lincoln northeasterly into the upper Platte River gulch.

Two Dormant But Famous Districts—Creede and Querida—both silver producers, may be revived if present rumors materialize. The Mineral County deal is said to involve the Last Chance, Amethyst, Creede United and New York Chance mines which are under option to Eastern men who propose to drive a central tunnel and to operate the large acreage from one surface plant. In Custer County the old Bassick mine is the attraction. This is a mine that, in addition to having produced heavily in lead and some wonderful horn-silver ore, presents an interesting geological study. The oreshoots fill extinct geyser ducts, the ore being incrustations on the rounded and subangular fragments of trachyte eroded from the walls and now cemented together with a mud that is kaolinized. Besides silver, the coatings of the pebbles contain various minerals of zinc, pyrite, galena, chalcocite and some sylvanite.

SALT LAKE CITY—Aug. 10

The Geological Survey in Big Cottonwood Cañon, now being conducted by the U. S. Geological Survey, has reached Silver Fork and South Fork in the neighborhood of the Cardiff mine. Considerable detailed mapping will be necessary. B. S. Butler, who reported on the geology of Beaver County, is in charge of the survey of the Alta-Cottonwood district.

The First Reduction in Wages—raised several times in the last year, with the rising prices of metals—has now been made by various Bingham and Tintic properties, following the recent lower price of copper. This reduction of 25c. per day was stipulated at the time the increases were made. The Utah Copper Co. has posted notices to this effect at the mine and at the Magna and Arthur plants. The reduction in Tintic is

caused partly by the lessened demand for certain classes of ore as well as by the fall in the prices of metals.

Sale of Ohio Copper Co. Property at Bingham and Lark on Aug. 29 is advertised by the sheriff to satisfy a judgment obtained some time ago by the bondholders. The mining claims will be sold at 10 a.m. at the Salt Lake County court house, and the mill and other property in the afternoon at the Lark mill. It is thought that the property will be bid in by the bondholders, although there is a possibility that other mining interests in Bingham may acquire a part of the claims. The property has been advertised in detail in the papers, and under the advertisement it is stated that the purchase price shall be payable in lawful money of the United States, except that the purchaser of any property, after payment in money of proportional share of the costs, may answer his bid with the bonds and coupons of the Ohio Copper Co., upon which judgment was given, and which shall be received in payment for an amount equal to the money to which the holder will be entitled on distribution of the purchase price paid at the sale. The General Exploration Co., which had a lease up to May 20, 1916, is still operating the mine and mill, but the property will be turned over as soon as reorganization has been effected. The leasing company, under the management of Alfred Frank, has been mining and milling 2,240 tons of ore daily, that carried about 21 lb. copper to the ton. The copper minerals are finely disseminated in hard quartzite, making a high recovery by water concentration difficult. Under present milling practice a recovery of about 11 lb. copper per ton was made. Mining by caving has been done very cheaply, the costs being around 22c. per ton, with 16c. per ton transportation charges, through the Mascotte tunnel, to the mill. Copper production has been around 725,000 lb. per month, and operating profits on 27c. copper have been estimated at $101,000 a month. Royalties amounting to $15,000 monthly were paid by the lessees. There was a sliding scale which called for 10% royalty on 16c. copper, and 2% additional for each 1c. increase in the price, making a royalty of 32% with copper at 27c.

FLAT RIVER, MO.—Aug. 8

The Madison County Silver Mine is finding some excellent ore. This mine, worked many years ago for silver, is being reopened by a New York syndicate. The ore consists of argentiferous galena, sphalerite, and wolframite occurring in a quartz vein cutting granite. The tungstic-acid tenor is about 3%. A mill is being constructed and the ore will be treated with stamps, tables and flotation.

New Means of Disposal for Mill Slimes are being adopted by mining companies in the Southeastern Missouri lead district, as it is necessary for the companies to stop emptying the slimes into Big River, the main drainage stream of the district. The St. Joseph Lead Co. is now building a settling basin at Bonne Terre for this purpose. Chat is being used for the dam, which will be approximately 50 ft. in height. The basin will cover about 25 acres. The other lead companies are building similar basins. The slimes will be allowed to settle in the basins, the clear water filtering off through the chat dams.

July Was a Prosperous Month in the Southeast Missouri lead belt, despite the decline in the lead market. All the operations were running to capacity and there were no labor troubles, except for a two-days' strike at the Hoffman, a property of the St. Joseph Lead Co., at which place the miners went back to work after withdrawing their demands. Wages are good, the miners and mill men getting a bonus of 30%. Labor is plentiful as many men are coming into the district from Joplin. The two principal smelting plants, that of the St. Joseph Lead Co., at Herculaneum, Mo., and that of the St. Louis Smelting and Refining Co., at Collinsville, Ill., are now getting all the lead concentrates that they can handle.

Much New Metallurgical Equipment is being tried in this district. Butchart riffles and tables are being extensively installed throughout the lead belt. Mr. Butchart has been personally superintending the installations. The St. Joseph Lead Co. and the Doe Run have placed these riffles on all of the Wilfley tables. The National and the Desloge companies are replacing their old tables with Butcharts. The Federal Lead Co. is reported to have recently closed a contract with Mr. Butchart to supply half of the tables for the new mill. The Butchart table is proving generally satisfactory, making a clean tail and a high-grade concentrate. Each table handles from 65 to 75 tons of material daily. Other metallurgical machinery now being tried out in this district is a Marcy ball mill at the Rivermines plant of the Doe Run Lead Co.; and a Hardinge mill at the Bonne Terre concentrator of the St. Joseph Lead Co., using a feed of jig middlings. Flotation has been coming to the front rapidly. The Minerals Separation and Callow machines are both used. All of the companies are carrying on tests with various oils in their laboratories, and it is reported that the St. Joseph Lead Co. will soon build an experimental laboratory and fully equip it with the necessary apparatus for flotation and mill-experimental work. Oliver and Kelly filters, and steam driers are used to dry the flotation concentrates.

JOPLIN, MO.—Aug. 12

Curtailment of Zinc Ore Production in this district is not so great as is indicated by the turnins. Reports are based on sales and shipment and the smelters have been buying so lightly recently that the bulk of sales has been small. There is a constantly swelling surplus of ore, and while numerous mines are down, others continue to operate and pile up a reserve.

American Zinc, Lead and Smelting Co. plans extensive development of its recently acquired Granby land. Although definite announcement has not yet been made by officials of the company, it is known that one mill, to be the largest in the district, is contemplated, and also one or two other mills. The big mill is to be built south of the camp of Granby, where recent drilling showed unusually rich deposits. The mill, it is said, will have a capacity of 2,000 tons.

Joplin Ore and Spelter Co. has completed two additional blocks at its Pittsburg, Kan., smeltery. The blocks are of 224 retorts each, and bring the total number of retorts at this plant to 1,792, with a capacity of approximately 14,380,000 lb. of spelter per annum. The new smeltery of the Picher Lead Co. at Henryetta, Okla., is also virtually completed, but it is understood will not be started until some solution of the wage problem at the other Henryetta smeltery has been made. At present only one block is being operated at the latter plant.

PLATTEVILLE, WIS.—Aug. 12

The Camp of New Diggings, 2½ mi. southeast of Benton, is developing into one of the largest shippers in the district. It was a large lead producer in early days, after which it remained inactive until a year ago. While not on the railroad, a good macadam road has been built to Benton station and large Garford trucks handle as high as 100 tons daily or 500 tons a week per truck, bringing the haulage cost down to less than 25c. a ton.

BRAINERD, MINN.—Aug. 12

I. W. W. Labor Disturbances have finally reached the Cuyuna district. On Aug. 7 the Croft mine was shut down, and other underground operations on the range have since pursued the same course. The Kennedy mine at Cuyuna still continues to operate, although short-handed. A peculiarity of the so-called strike on this range is the fact that no formal demands were ever made on the mine operators. The strikers simply ceased working and began parading, without meeting the operators or discussing the matter in any way. From statements made by the strike leaders it has been made public that they demand an 8-hr. day, going to and from the work on the company's time, $3 wage per day in dry places and $3.50 in wet places, with no contract work. On Aug. 11, the first lawlessness occurred when a number of shots were exchanged. The offenders were promptly lodged in jail at Brainerd and 75 deputies are now maintaining order. The business men both of Crosby and Ironton have organized to assist in enforcing law and order, and ordinances have been passed prohibiting public demonstrations or parades.

TORONTO—Aug. 12

An Embargo on the Exportation of Mica and micanite to destinations outside of the British Empire has been established by the Canadian government. Special licenses may, however, be granted for the exportation of Canadian mica and micanite consigned to the order of the British consul general, New York, when the purchasers are approved by him and have furnished the required guarantees.

The Nickel-Refinery Site is not yet definitely settled. The report that the Interntional Nickel Co. would proceed at once with the erection of the refinery on the optioned site at Port Colborne, Ont., the Lake Erie port of entry of the Welland Canal, is apparently premature. Hon. G. Howard Ferguson, Ontario Minister of Mines, states that although the company has secured an option on the Port Colborne site, the location of the plant there has not been finally determined and that other proposals are under consideration. The agitators for the refining of all nickel in Canada strongly object to the location of the plant at Port Colborne on the ground that it is too near to the American border. Strenuous efforts are being put forth by the citizens of North Bay, Hamilton, and other places to secure the industry. The Minister of Mines favors a Northern Ontario location.

The Mining News

ARIZONA

Gila County

ASBESTOS FIND made by Pierce and Kyle, 45 mi. north of Globe.

INSPIRATION-NEEDLES (Miami)—Force of 31 men at work with three churn drills; two additional machines ordered.

EMPIRE ZINC (San Xavier)—Shipping carload copper ore daily; erecting 50 houses; will increase force to 150 men.

Greenlee County

ARIZONA COPPER (Clifton)—July production 2,200 short tons copper.

SHANNON COPPER (Clifton)—Will begin at once erection of first unit of leaching plant to handle oxidized copper ores that are unprofitable to smelt.

EAGLE GOLD AND COPPER (Morenci)—Carlyon & Bunkerl, lessees, have shipped 4 carloads manganese-copper ore to the Shannon smeltery at Clifton; ore carries 20% copper; packed 5 mi. on burros.

ARIZONA NATIONAL COPPER (York)—Another new copper operation on the New Mexico-Arizona line, adjoining the Arizona-Mayflower. Principal development is a 130-ft. shaft on Commerce claim.

ARIZONA-MAYFLOWER (York)—New organization of W. B. Duvall and S. D. Corely, of Duncan, to develop 30 claims, near New Mexico-Arizona line, 9 mi. from York. Ore contains 4% copper, also gold, silver, zinc, lead and considerable bismuth.

Mohave County

LUCKY BOY (Oatman)—Resumption expected about middle of August.

BOUNDARY CONE (Oatman)—Compressor repaired and work resumed on 750-ft. level.

UNITED WESTERN (Oatman)—Crosscutting north on 505-ft. level; crosscut advanced about 370 ft.

CARTER (Oatman)—Control option reported given to Keith & Keith, of Boston. Good ore opened on 350-ft. level.

SCHENECTADY (Chloride)—High-grade lead-zinc-silver ore struck on 120-ft. level; similar to ore from 1,400-ft. level of Tennessee mine.

Pinal County

MAGMA (Superior)—Copper production 2,232,936 lb. in quarter ended June 30.

ANDRADA (Casa Grande)—Shaft being sunk on copper-silver vein; hoist, compressor and drills will be installed; R. W. Ramsdall owner.

ARMENTA BROS. (Casa Grande)—Recently shipped 200 sacks of high-grade silver-lead ore.

Yavapai County

VERDE VALLEY FARMER'S AND STOCKMEN'S PROTECTIVE ASSOCIATION has been formed by farmers in the Verde Valley in the vicinity of the United Verde Copper Co.'s smeltery for purpose of treating with company on smoke trouble. It is said some have taken up barren hillsides so as to collect smoke damage.

JEROME VERDE (Jerome)—Main shaft enlarged down to 325-ft. level.

TIGER TUNGSTEN (Crown King)—Mill closed account strike for more pay.

DUNDEE ARIZONA (Jerome)—Shaft down 300 ft.; sinking at rate of 5 or 6 ft. a day.

JEROME VICTOR (Jerome)—Unwatered to 600-ft. level; pumps gaining on water but slowly.

KAY COPPER (Cañon)—Sold to J. A. Salsbury, of New York; deep development will be started.

FLORA (Prescott)—Struck scheelite ore running 17% WO_3 in Hassayampa district; will drive 400-ft. tunnel.

CALIFORNIA & ARIZONA MINING (Prescott)—Will install pumps to raise gravel from potholes in Hassayampa River.

MONARCH (Wickenburg)—Shipping from 10,000-ton dump; $50 ore encountered at 240 ft.; has good auto road, camp buildings and mill.

UNITED VERDE EXTENSION (Jerome)—Has installed 250-hp. engine for use as a spare in case of interruption of electric power by winter storms.

PITTSBURGH JEROME (Jerome)—C. R. Ballard, manager, reports good strike copper ore below 600-ft. level; heavier machinery will be installed as soon as 2-mi. road is completed.

Yuma County

COBRITA MINES (Salome)—Has made shipment of 20% copper ore.

GLORY HOLE BONANZA MINES (Salome)—Has started active work at old Glory Hole mine.

ALICE (Parker)—Group in Riverside mountains, sold to J. C. Rankin, of Chicago; will be developed at once.

YUMA WARRIOR (Salome)—Developing Harquahala mine; gold strike reported on eighth level under the old Castle Garden stope; enough oxidized ore being taken from development work to keep mill dropping 30 stamps one shift daily; sulphide ores being stockpiled to be treated in a new mill; John B. Martin, superintendent.

CALIFORNIA

Amador County

KEYSTONE (Sutter Creek)—Station being cut on 1,800 level of incline shaft whence crosscut will be driven to orebody. The 40-stamp mill crushing ore from the 1,000, 1,200, 1,400 levels.

Los Angeles County

POTASSIUM MANUFACTURING CO. (Los Angeles)—Organized to extract potash and other chemical products from kelp; J. P. Waters, John A. Beck, George J. Schmitt and Walter P. Hansell interested. Patents of J. T. Armstrong are to be utilized.

Placer County

BOREALIS CONSOLIDATED (Auburn)—Controlling interest transferred to J. C. Winters, of New York. Property includes three mines known as Eureka, Hathaway and Kirkland, situated in Ophir district. Active development contemplated.

Sacramento County

CHROME ORE INDUSTRY in vicinity of Folsom is being developed extensively. Hill & Hobler, representing San Francisco men, have four motor trucks hauling ore from Negro Hill district to Folsom; shipping three cars a week, all of which goes to Illinois and Pennsylvania. Another company will be shipping as soon as wagon road is completed.

NATOMAS CO. (Natoma)—Reconstruction of Natoma No. 1 near Fairoaks junction is about ready to receive machinery. Work on Dredge No. 7, wrecked some time ago, is progressing; extensive hull repairs said to have been necessary. Dredge No. 4 reconstructed last fall and designed to place soil on top of the gravel leaving the surface level for agricultural use, is now doing good work.

Shasta County

NICKEL ORE reported to have been smelted at Heroult; the ore came from Grants Pass, Ore. Three electric furnaces in operation, two of these treating manganese are supplied from directly across the Pit River and other sources. Employing 125 men.

PITTSBURGH & MT. SHASTA (Keswick)—This gold mining and milling company operating in the copper region near Keswick, having produced $132,000 in gold, will now mine for copper. Permitted to sell 232,500 shares at 30c. to be expended in prospecting and obtaining patent on 22 claims.

Sierra County

AT MOUNT ALTA, rich gravel is being washed. Main tunnel being extended upstream along bedrock, with crosscuts at 35-ft. intervals blocking out gravel for future operation. Fifteen men employed. E. E. Sutro and associates, of San Francisco, own and operate. Nelson Chatfield in charge.

IRELAN (Alleghany)—Another pocket of rich sulphides recently encountered. Quartz vein 5 ft. wide streaked with rich mineral seams. Lower 1,400-ft. tunnel to be driven to 2,000 ft. and connected with upper workings. Fifty-ton ball mill and sawmill being installed.

ROCK CREEK (Downieville)—On Alleghany-Downieville serpentine belt. Tunnel disclosed rich shoot over 100 ft. in length with north end not in sight. Mill installed and crushing begun on high-grade ore stored in bins. Dolan & Bell own and operate.

WISCONSIN-NORTH FORK (Forest)—Amicable disassociation of these old gravel properties effected. The Wisconsin will be opened from the northwest side, with D. E. Hayden in charge. The North Fork, managed by G. F. Stone, will continue sinking 200 to 400 ft. through faulted formation to open quartz vein encountered during operations as a gravel mine.

Siskiyou County

JOE BAR (Yreka)—E. J. Steel purchased this placer mine and is preparing to operate.

PENNSYLVANIA (Yreka)—Rattles and Fawcett have taken over this placer on Elliott Creek.

GOLD RUN (Etna Mills)—W. L. Beall sold his interest to New York men who are preparing to operate on extensive scale.

Trinity County

MANGANESE CO. (Wildwood)—First motor-truck load of two tons of chrome ore from this property hauled to Redding on a test trip by E. L. Curtis; more trucks engaged for same service. Cost of hauling about $7 per ton, distance 60 mi. Company expects to extract and deliver 10,000 tons chrome ore this season.

Tuolumne County

SPRINGFIELD TUNNEL (Columbia)—Company has purchased Elliott property and contemplates early operation. Shaft is being sunk on Ranch mine to intersect deposit of rich gravel opened by 1,200-ft. drift from main drainage tunnel. Tunnel, now in 2,800 ft., will be driven 2 mi. further.

COSMOPOLITE (Groveland)—Optioned by Arthur Brown, J. W. Skelton, Gurley Jones and other Tonopah men. Five claims, equipped with 5-stamp mill, compressor and other machinery, electrically operated. Contemplate installation of ball mill and other equipment to increase capacity to 50 tons.

COLORADO

Clear Creek County

OCEAN WAVE (Idaho Springs)—This Soda Creek property being developed by Bean and associates.

COLORADO CENTRAL (Georgetown)—Marshall tunnel dump being sampled. Mine may be reopened.

EDGAR (Idaho Springs)—Lessees on ground west of Big Five tunnel making regular shipments of good-grade milling ore.

BURNS-MOORE (Idaho Springs)—This property up Chicago Creek leased by G. A. Yeager and associates, who will advance tunnel.

EDGAR (Idaho Springs)—Being developed through Big Five tunnel by Boston Leasing Co. Winze will be sunk an additional 100 ft.

TROJAN (Idaho Springs)—Humphrey & Jones have leased this Gilson Gulch property. Main tunnel advanced 200 ft.; streak of tungsten ore opened.

QUEEN (Idaho Springs)—This property on Seaton Mountain leased to Polly & Hayes, who have installed a hoist and other equipment. A 2½-ft. vein of tungsten ore opened in 20-ft. shaft. Dump will be sorted.

ENID BIG 4 TUNNEL CO. (Idaho Springs)—This new company is incorporated for $150,000; R. W. Shaw, president; A. J. Crosson, manager. The Soda Creek tunnel advanced 300 ft. on low-grade vein; breast shows 3-ft. vein of $7 milling ore.

Hinsdale County

SULPHURET (Lake City)—Lessees sinking incline shaft on vein. Sublease on Cora ground let recently.

PELICAN (Lake City)—Lessees opening good oreshoot in new drift.

GOLDEN FLEECE (Lake City)—New mill nearly completed. Old dumps will be treated while carrying on mine development.

Lake County

WESTERN MINING (Leadville)—Wolftone shaft now drained to 1,000-ft. level. Producing 350 tons zinc-carbonate ore daily.

LACAWANA BELLE (Leadville)—Being worked under lease and bond by Leadville men. Main tunnel being driven in oreshoot.

MANSFIELD (Leadville)—Clarence Jarbeau has leased this group on Prospect Mountain and will advance Lamphier tunnel 250 ft. by contract.

JULIA MINING (Leadville)—This company, under management of Clarence Jarbeau. is shipping 50 tons daily of iron-manganese ore from Cloud City mine, recently drained through Penrose shaft.

FORTUNE (Leadville)—James McNeece, owner, has opened this old property to leasers. Shaft is to be sunk 200 ft. Lead ore high in gold opened, and zinc carbonate being shipped steadily from upper levels.

Park County

TUNGSTEN DISCOVERIES made recently on J. G. Blaine, Rainbow group and Buckskin Joe.

LONDON (Leadville)—Production in first half of 1916 greatest yet made.

San Juan County

SILVERTON SHIPMENTS of crude ore and concentrates in July were: Davey Leasing Co., 40 cars; Gold King, 36; Sunnyside, 35; Congress, 25; Iowa-Tiger, 20; S. D. & G. Lease, 17; St. Paul, 21; Dora, 14; J. M. Hyde, 7; Dives Leasing, 6; Atlantic, 5; Pueblo, 4; Silver Lake, Kittimac, Pride of the West, Nevada Leasing and Barstow, 3 cars each; Silver Ledge, North Star, M. E. Watson, Intersection, and Big Giant, 2 cars each; Highland Mary Leasing Co., Joker Tunnel, Hudson, Rogers Leasing, Kansas City, Morgan, J. A. Johnson, Andren-Jackson, one car each; miscellaneous, 5 cars; total, 264 cars.

HIGHLAND MARY (Silverton)—This property at head of Cunningham Gulch leased by J. H. Slattery and Otto Mears.

TOM MOORE (Silverton)—Repairing underground workings preparatory to early resumption. S. L. Martin, superintendent.

NORTH STAR (Silverton)—Boarding house on King Solomon Mountain destroyed by fire, will be rebuilt. Recent underground development highly satisfactory. Philip Flynn, manager.

San Miguel County

TELLURIDE SHIPMENTS of concentrates in July were: Tomboy, 48 cars to Durango; Smuggler-Union, 29 cars to Durango and 14 cars to Blende; Liberty Bell, 15 cars to Durango; Anderson, 2 cars to Florence; Wagner Bros., 2 cars to Durango; total 110 cars.

TOMBOY (Telluride)—In July crushed 13,000 tons, yielding bullion, $37,800, and concentrates, $56,000; operating profit, $28,300.

PRIMOS CHEMICAL CO. (Vanadium)—Mill running at capacity on ore from the Sawpit and Bear Creek properties. Additional equipment being installed at mill. Placerville work temporarily discontinued. About 100 men employed by company in San Miguel County.

IDAHO

Idaho County

GOLDEN SCALE PLACER (Elk City)—William C. McNutt, owner, has started cleanup, after exceptionally long season.

GOLDEN RULE (Elk City)—C. Tiederman and Frank Bosch, owners, are cleaning up at this placer; have handled larger amount of gravel than in former years, owing to favorable water conditions.

MINERAL ZONE (Elk City)—The 3-stamp mill, erected on this property during November, 1915, has been in continuous operation ever since. G. L. L. Baskett, owner. Ore exposed on 50-ft. level for 285 ft. and on 100-ft. level for 735 ft. In near future, inclined shaft is to be sunk to the 200 level and mill is to be enlarged. M. F. Tytler, consulting engineer.

MINNESOTA

Mesabi Range

MAHONING (Hibbing)—One shovel stripping at northwest side of pit; many shovels removing ore. Plans at the beginning of the season called for shipments of 2,900,000 tons this summer.

HAROLD (Hibbing)—Ten thousand tons of ore from stockpile is being shipped by rail to Mississippi Valley Iron Co. at St. Louis, Mo. A long all-rail shipment, and the record for this section.

SUSQUEHANA (Hibbing)—Screening plant for separating waste rock from ore now in operation. Power plant under construction; brick-and-steel building will contain three 220-hp. boilers with automatic stokers, besides modern pumps and other equipment.

MISSOURI

Joplin District

GALENA B (Neck City)—Shaft sunk to 228-ft. level to supply mill with water; operations resumed.

BUCKEYE (Galena, Kan.)—Property leased by Price, Devaney and Cole. Draining just completed.

NATIONAL (Joplin)—Mill struck by lightning a month ago, repaired. Three shafts mining 3 to 6% ore.

ZINC CORPORATION (Carterville)—Tract of 800 acres now being drained to 200-ft. level by one Pomona pump.

SCOTTISH (Aurora)—Opened second shaft on United Zinc Co. lease and will now produce three cars every fortnight.

CHAMPION (Duenweg)—New mill completed and about 15 tons silicate being made daily. Mining in several drifts at 75-ft. depth.

B. L. & G. (Cardin, Okla.)—Good ore found in all five drill holes. Ore from 140 to 182 ft. Tract adjoins Admiralty Zinc Co. on south.

D. C. & E. NO. 2 (Webb City)—Started new mill in Oronogo bottoms; capacity now 375 tons per shift. Only one of three shafts opened.

TAR CREEK (Cardin, Okla.)—Four drifts show 28-ft. face of rich lead ore at shallow level; new mill turning out 40 tons of lead concentrates weekly. Unable to sink to lower levels account much water.

MONTANA

Jefferson County

BOSTON & MONTANA DEVELOPMENT (35 Congress St. Boston, Mass.)—Park vein encountered in crosscut run from main tunnel at company's Elkhorn mines at head of Wise River. Vein is 14 ft. wide; shows high-grade and milling ore. At company's Spain mine in French Gulch, Deerlodge County, second consignment of motor trucks has arrived and will soon be hauling ore to new spur on Mill Creek connecting with Washoe smeltery.

Flathead County

SNOWSTORM (Troy)—The Banner & Bangle mines recently taken over by this former Cœur d'Alene operating company, are surpassing expectations. Four hundred thousand tons of ore are blocked out that are expected to average 7½% lead, 8½% zinc and from 4 to 5 oz. silver. Mine developed by six tunnels. Mill will be ready last of September.

Lincoln County

ROSE CONSOLIDATED (Libby)—The 10-stamp and concentration mill will be completed by end of month. Tungsten concentrates will be recovered from old tailings. Ore blocked in mine reported to run about $16 in gold per ton. Also some tungsten.

Sanders County

F. S. HOUGHLAND and associates have shipped from Thompson Falls a car of antimony ore, assaying 58.7% Sb, 0.56% As and 0.40% Fe.

Silver Bow County

EAST BUTTE (Butte)—July output at company's Pittsmont smeltery was 1,893,120 lb. of copper and 49,892 oz. of silver, as against 1,639,560 lb. of copper and 41,503 oz. of silver in June. Copper production for seven months was 10,194,120 lb. Cash surplus, Aug. 1 was over $1,400,000.

DAVIS-DALY (Butte)—Excavations for building operations on Davis-Daly ground, which extends through the central part of Butte for about a mile, have shown existence of two veins 40 and 23 ft. wide respectively. Both are ahead of the crosscut being driven westerly on the 2,500 level and lie several blocks west of the Colorado shaft. Foundation for new hoist completed; expected to arrive within a week.

BUTTE & SUPERIOR (Butte)—On the night of Aug. 8 the king bolt holding skip to cage broke when cage was within 150 ft. of surface, allowing skip with its 5 tons of ore to fall to 1,100 level, doing considerable damage to shaft timbers and causing mine and mill to be shut down for several days. Fortunately skip was caught by timbers near 1,200 level and all the men working in the sump below escaped. Another fortunate feature was that new shaft is now finished to 1,500 level making it possible to hoist the men through it.

NEVADA

Esmeralda County

BUTTE GOLDFIELD (Goldfield)—Occasional shipments are being made. Leasers have recently opened 16-in. vein assaying $60 per ton.

PIONEER CONSOLIDATED (Pioneer)—Mill treating 35 tons per day. Amalgamation used. Saves about 65%. Tailing impounded. Higher grade ore segregated for shipment, recent consignment of which assayed about $120 per ton.

Humboldt County

RAGGED TOP (Jessup)—These tungsten mines sold to H. M. Byllesby Co., of Chicago. At present about 35 men employed. Will build mill.

ROCHESTER MINES CO. (Rochester)—Codd winze, now down about 800 ft. on dip of vein, is breaking fair mill ore with occasional occurrence of native silver; will connect with

Friedman tunnel and become main outlet from upper workings.

Lincoln County

HAMBURG MINES CO. (Pioche)—Recently organized to work property in Highland district, idle since 1893.

SILVER COMET MINING CO. (Pioche)—Sixty-ton concentrating plant running steadily. Situated in Comet district.

MEADOW VALLEY LEASING CO. (Pioche)—Organized to take over holdings of Yuba Leasing and Development Co. Now operating at No. 3 shaft.

CONSOLIDATED MINING AND SMELTING CO. (Pioche)—Organized to work property about 78 mi. from Pioche. Manager Young states small smelting furnace is being erected.

PRINCE CONSOLIDATED (Pioche)—Dividend of 5c. per share, about $50,000, declared payable Sept. 1. Shipments of ore to Salt Lake continue at about 3,500 tons per week.

CONSOLIDATED NEVADA-UTAH (Pioche)—South crosscut, 1,400-ft. level, in quartzite beyond Yuba dike. Some shipping ore being saved above this level. Mill producing three to four cars concentrates per week.

Lyon County

NEVADA-DOUGLAS (Ludwig)—July shipments amounted to about 25 cars valued between $40 and $50 per ton. Low-grade ores are treated at company's leaching plant.

Mineral County

PITTSBURGH DOLORES (Yerington)—Treating about 70 tons daily of arsenical and antimonial gold-silver ore; cyanide consumption 0.8 lb. per ton. E. J. Schrader, manager.

YERINGTON MOUNTAIN COPPER CO. (Schurz)—Operating producing property, near Schurz, and recently purchased from Glasgow & Western Development Co. the old Adelaide mine situated near Golconda, Humboldt County.

Nye County

TONOPAH ORE PRODUCTION for week ended Aug. 5 was 9,662 tons, valued at $199,996, compared with 9,217 tons for week previous. Producers were: Tonopah Belmont, 2,972 tons; Tonopah Extension, 2,200; Tonopah Mining, 2,000; Jim Butler, 1,200; West End, 718; Halifax, 218; Rescue-Eula, 149; North Star, 59; miscellaneous, 146 tons.

HALIFAX-TONOPAH (Tonopah)—Repairs to northerly crosscut on 1,700-ft. level completed and face being advanced. Stopes between 1,200-ft. and 1,300-ft. levels continue to produce about 175 tons per week.

AFTER ALL MINES CO. (Tonopah)—Northeasterly crosscut being driven on 1,540-ft. level of Tonopah Extension's Victor workings toward Jim Crow claim, from which point general development will be undertaken.

MONARCH PITTSBURGH (Tonopah)—Group of three claims in western section joining Tonopah Extension ground. East and west drifts being run on 1,000-ft. level on north-dipping contact-vein recently encountered about 800 ft. west of shaft.

Storey County

ANDES (Virginia)—Saved 25 cars of ore from development work on 350 level.

UNION CONSOLIDATED (Virginia)—Extracted 383 tons of ore: 2,400 level 202 tons, $31.66; 2,500 level 37 tons, $15.21 and 144 tons, $15.30. Started reopening old 2,300 station of the shaft.

MEXICAN (Virginia)—South drift on west crosscut 2,500 level advanced to 86-ft. point, porphyry and quartz in face. Mexican mill crushed 493 tons custom ore, $25.95 and 122 tons from Mexican storage pile, $11,10 per ton.

NEW YORK

Orange County

FOREST OF DEAN (Highland Falls)—Fall of rock in this iron mine, Aug. 13, killed one man and seriously injured two others.

OREGON

Baker County

HOMESTEAD-IRON DYKE MINES CO. (Homestead)—Shipping about 75 tons daily of 7% copper ore to International smeltery, Tooele, Utah. Building 150-ton concentrator; to be ready in September. Emmet F. Galligan, superintendent.

Josephine County

TAKILMA SMELTING CO. (Takilma)—Shipping from Queen of Bronze mine about 15 tons daily, carrying 10% Cu and $4 gold, to Tacoma Smelting Co. Since May, 1,000 tons have been shipped. Hauled by wagon or auto truck 27 mi. to railroad at Waters Creek. Roy H. Clarke, manager.

UTAH

Juab County

TINTIC SHIPMENTS for week ended Aug. 4 amounted to 203 cars by 26 shippers. The Dragon Consolidated, Chief Consolidated, and the Centennial-Eureka made the largest outputs.

IRON BLOSSOM (Silver City)—Sinking winze in north end of mine near the copper deposit; winze was in ore around the 1,100, but is now in limestone, the copper having dipped to the west. Sinking will be continued to the 1,200, and drifting done to reach orebody.

EAGLE AND BLUE BELL (Eureka)—Work done in the shaft recently indicates the new strike to be of importance. Shaft has been in ore for about 40 ft., and will be continued until in solid ground well below the ore deposit. This will probably be around the 1,900 level, which is still 150 ft. above the water level.

Piute County

FLORENCE MINING AND MILLING (Marysvale)—Ground is being broken for erection of a potash mill near the terminus of the Denver & Rio Grande R.R. at Marysvale.

MINERAL PRODUCTS (Marysvale)—During last three months changes in potash mill have nearly doubled output; dust chamber and flues added. Ore development has exceeded expectation; sufficient alunite developed to supply the 100-ton plant several years. The fissure carrying alunite is up to 100 ft. wide in places, and other veins parallel the main vein. The tunnel, driven in the vein 1,500 ft., is still in ore.

Salt Lake County

ALTA-MAMMOTH (Alta)—Incorporated Aug. 3 to work nine silver-lead-copper claims in Little Cottonwood Cañon, half a mile above Tanner's Flat. J. Thomas, president.

UTAH METAL & TUNNEL (Bingham)—First dividend amounting to about $350,000, or at the rate of 50c. a share will be paid Aug. 15. Profits for the first quarter of 1916 were $367,523. Gross value of the ore was $678,172, and with income from sale of water, rents, etc., total income was $690,-177. Has retired bonds amounting to $129,250, leaving $245,-750 outstanding. Cash on hand Apr. 1 and due for metal sold was $961,827. Total profits for 1915 were $594,295. Of this $216,727 came from the Utah Metal end, which began production in May, and $377,568 from the Bingham-New Haven end. Mill recently enlarged to treat 240 tons; flotation installed at a cost of $18,000.

Summit County

PARK CITY SHIPMENTS for week ended Aug. 4 amounted to 4,479,987 lb.; seven shippers.

THREE KINGS (Park City)—Will sink winze on fissure recently opened on 520-ft. or bottom level.

NEW QUINCY (Park City)—Ore was cut Aug. 7 in western workings about 300 ft. above the 900 level. Extent of new find not yet known.

SILVER KING CONSOLIDATED (Park City)—Air connections made between mine and the proposed drain and development tunnel in Thaynes Cañon. Machine drills will soon be started. Ore buckets for new tramway arrived, and cable will be up soon. Production at present about 60 tons a day. Remodeling mill.

AMERICAN FLAG (Park City)—Park City Mines Co. operating a lease is unwatering the 1,100 level. Proposed to sink the shaft, to reach the intersection of American Flag vein dipping east, with the Easter vein, dipping west; expected a short distance below the 1,100. John H. Leavell, H. R. MacMillan, John Pingree and F. V. Bodfish are interested.

Utah County

PACIFIC (American Fork)—Copper-silver ore is being shipped. Returns from shipments this year have been about $20,000. Raising on vein is in progress.

WISCONSIN

Zinc-Lead District

LITTLE GIANT (Shullsburg)—This old mine reopened and producing good ore.

MULCAHY (Shullsburg)—Finished its 200-ton mill and is completing magnetic separating plant to remove the pyrite.

WINSKELL (Shullsburg)—Continues to be a large shipper; now working beneath the "glass rock" horizon—deeper than the usual ore runs.

CANADA

British Columbia

BRITISH COLUMBIA COPPER (Copper Mountain)—After four years of diamond drilling on Copper Mountain, mine development has been commenced. A series of tunnels are to be driven at different levels. Power for initial development work is being obtained from B. C. Portland Cement Co., 14 mi. from Copper Mountain. Current is transformed to 15,000 volts and carried to Copper Mountain over a temporary high-tension line of No. 4 galvanized fence wire; at the mine it is stepped down to 2,200 volts. Compressor plant consists of a Canadian Rand two-stage 10-drill compressor, belt-connected with 150-hp. motor, and a Chicago Pneumatic 6-drill compressor, belt-connected with a 100-hp. motor; Leyner sharpener. First tunnel started on the 3,945 level, now in 500 ft., progressing 18 ft. per day, size 9x10 ft. Bad ground encountered first 300 ft., which necessitated timbering; condition now improving and better rate of progress expected. Diamond drills still being operated both on Copper Mountain and Kennedy Mountain.

Ontario

CROESUS (Munroe)—Buildings destroyed by the fire of July 29 will be rebuilt.

DOME LAKE (Porcupine)—Shaft, down 400 ft., will be continued to 700 ft. Some equipment for 200-ton mill ordered.

DOME EXTENSION (Porcupine)—In first drill hole to tap Dome ore system, 90 ft. of ore reported cut at depth of abcut 1,000 ft.

NIPISSING (Cobalt)—During July mined ore valued at $288,577; bullion shipped from Nipissing and customs ore, $280,188.

REPUBLIC (Porcupine)—At this mine (formerly the Success) shaft is down 300 ft. Crosscutting is being done in a mineralized belt.

McINTYRE (Porcupine)—Vein along the McIntyre Extension line drifted on for 500 ft.; varies in width from 8 to 40 ft. The big vein on 700-ft. level drifted on for 300 ft.

MILLER INDEPENDENCE (Boston Creek)—New high-grade vein struck about 500 ft. north of original vein; stripped for about 15 ft. Underground work suspended account shortage of water.

WEST DOME CONSOLIDATED (Porcupine)—No. 3 shaft dewatered and sampled, assays running from $4.80 to $8.20 per ton. Diamond drilling disclosed new vein, 6 ft. in width, assaying $14.80 per ton, at an incline depth of 1,229 ft.

HOLLINGER CONSOLIDATED (Porcupine)—For four weeks ended July 14, gross profits were $215,165, from 45,320 tons; average value, $9.15 per ton; working cost, $3.74 per ton milled. Deficit, owing to increased dividend requirements on new capitalization, was $202,934. Delays in delivery of material for new mill now overcome.

The Market Report

Metal Markets

NEW YORK—Aug. 16

During the last week the markets for copper, lead and zinc were active and rising. All of them exhibited features of interest. Large business was done, especially in copper and lead, but also there were some important transactions in spelter.

Copper, Tin, Lead and Zinc

Copper—On Aug. 10 the Russian order for 5,000 long tons of copper, with regard to which there has previously been much interest, was placed. This business was done in London, with call for delivery at Vladivostok. There was sharp competition for it in which the sellers of Australian and Japanese copper participated. The offerings varied considerably according to the deliveries that could be supplied, and the placing of the order was apparently determined by the time requirements of the Russian authorities. The order was filled partly with Japanese, partly with Australian and partly with American copper. This transaction gave an impetus to the market here as well as elsewhere and the volume of business in the New York market, which had been swelling during the previous week, increased further. As in the previous week, the bulk of the business was with domestic manufacturers engaged in furnishing munitions. All of the large producers and agencies were in the market. Several of them agree in estimating that the total volume of transactions during the week was probably in the neighborhood of 50,000,000 lb., and judging from the individual reports to us we regard such an estimate as being not much out of the way.

The bulk of the business transacted during the last week was for November-December delivery. There was some October business done, but October copper is already becoming rather scarce. As to September copper, there is no longer any available, save for trifling quantities that may be with second hands. However, August and September copper is not much wanted, manufacturers being generally supplied fully for that time and gladly acceding to the delayed deliveries on the part of refiners, who have been unable in all directions to turn out as much as they expected.

Prices advanced steadily during the week and a good deal of variation was exhibited, depending upon the position of the sales books of the several producers. As soon as any one sold all of the October copper he wanted to, his asking price was raised. In general there was an increasing differential among the prices for October, November and December copper. A noteworthy feature of the week was good buying for delivery beyond 1916, extending as far as April, 1917. This business was taken at considerably lower prices than what are quoted for the major market at the present time. Sellers are naturally desirous of placing all the copper for 1917 that they can at anything like the present level of prices.

Respecting reports of huge sales to foreign governments, that have been widely circulating in the daily and financial papers during the last week, it may be confidently said that up to the time of our going to press no such business has been consummated. It is possible that some large business of that nature is in negotiation but if so agreement as to price has not been reached. It will be recollected that there were negotiations not long ago which failed owing to inability of the parties to come to terms.

Copper Sheets remain unchanged at last week's quotations, a base of 35½@37½c.

Tin—There was a little business done between dealers and small consumers. There was not much fluctuation in price and there were no features of general interest.

Lead—Some very large business was done, there being transactions for round lots on every day of the week. In the early part of the week some of these transactions were made at low prices. Sellers who had been pressing on the market being thus relieved, an increasing demand from consumers was able to satisfy itself only at rather sharply advancing prices. Beginning with Aug. 15, independent producers were able to realize better than the price of the A. S. & R. Co., and a further show of strength on Aug. 16 probably foreshadows an advance in price by the A. S. & R. Co. There was some noteworthy buying of lead for export during the week.

Spelter—Buying for export also developed in this metal and transactions attaining a handsome volume there was naturally an advance in price from day to day. The differential between prompt and future spelter has naturally contracted to rather small proportions.

The Anaconda company is to put in operation the first unit of its electrolytic plant at Great Falls this month. Additional units will go into operation in short order and the plant is expected to be producing at full capacity by the

DAILY PRICES OF METALS IN NEW YORK

Aug.	Sterling Exchange	Silver, Cts. per Oz.	Copper	Tin	Lead		Zinc
			Electrolytic, Cts. per Lb.	Spot, Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	St. Louis, Cts. per Lb.
10	4.7575	66¼	25¼ @25½	38½	5.80 @5.90	5.70 @5.80	8.00 @8.37
11	4.7569	66¼	25½ @25½	38¼	5.80 @5.90	5.70 @5.80	8.25 @8.50
12	4.7563	66¼	25½ @25½	39	5.80 @6.00	5.75 @5.85	8.25 @8.50
14	4.7569	66¾	25½ @26	39¼	5.95 @6.00	5 75 @5.85	8.50 @8.75
15	4.7569	66¾	25¾ @26¼	39	6.00 @6.05	5.85 @5.95	8.50 @8.75
16	4.7575	66¼	25½ @26¼	38¼	6.00 @6.10	5.90 @6.00	8.75 @9.00

The quotations herein are our appraisal of the average markets for copper, lead, spelter and tin based on wholesale contracts for the ordinary deliveries of the trade as made by producers and agencies; and represent, to the best of our judgment, the prevailing values of the metals, reduced to basis of New York, cash, except where St. Louis is given as the basing point. St. Louis and New York are normally quoted 0.17c. apart.

The quotations for electrolytic copper are for cakes, ingots and wirebars. Electrolytic copper is commonly sold at prices including delivery to the consumers and is subject to discounts, etc. The price quoted for copper on "regular terms" (r.t.) is the gross price including freight to the buyer's works and is subject to a discount for cash. Tue difference between the price delivered and the New York cash equivalent is at present about 0.25c. on domestic business. The price of electrolytic cathodes is 0.05 to 0.10c. below that of electrolytic. Quotations for lead represent wholesale transactions in the open market for good ordinary brands. Quotations for spelter are for ordinary Prime Western brands. Only the St. Louis price is herein quoted, St. Louis being the basing market. We quote the New York price at 17c. per 100 lb. above the St. Louis price.

Silver quotations are as reported by Handy & Harman and are in cents per troy ounce of silver bars 999 fine.

Some current freight rates on metals per 100 lb. are: St. Louis-New York 17c.; St. Louis-Chicago, 6.3c.; St. Louis-Pittsburgh, 13.1c.

LONDON

Aug.	Silver	Copper				Tin		Lead		Zinc	
		Standard		Electrolytic							
		Spot	3 Mos.	£ per Ton	Cts. per Lb.	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.
10	31⅛	110½	108½	124	26.40	169½	170½	29½	6.20	47	10.01
11	31⅛	110½	109½	124	26.40	171	172	29½	6.23	49	10.43
12	31	...	...	...	...	...	...	...	...	...	...
14	31⅛	116	113	125	26.61	173½	174½	29½	6.28	49	10.43
15	31⅛	114	111	126	26.83	172½	173½	30	6.39	49	10.43
16	31⅛	115	112	126	26.83	171	172	30	6.39	49½	10.54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for electrolytic, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2,240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at 4.80. £15 = 3.21c.; £20 = 4.29c.; £30 = 6.43c.; £40 = 8.57c.; £60 = 12.85c. Variations, £1 = 0.21⅞c.

end of October. The high-grade "Anaconda Electric" spelter is acquiring great popularity among consumers. Some large consumers in France have reported that this is the best spelter they have ever had.

By a typograhical error our spelter quotation for Aug. 8 was made to appear 7¾c. instead of 7¾@8c., which was intended, and is the correct quotation.

Montana Zinc Ore—Butte & Superior report for July a total of 51,710 tons ore treated, with a saving of 14,005 tons concentrates estimated to contain 15,200,000 lb. zinc.

Zinc Sheets show no change upon last week's quotations. Demand is fair. Price remains at $15 per 100 lb., f.o.b. Peru, Ill., less 8% discount.

Other Metals

Quicksilver—There was a further decline on small business. At the close we quote $72, New York. San Francisco reports, by telegraph, $75, market dull.

Antimony—This market was very unsettled during the week. A considerable business was done at prices ranging from 9 to 10c. We quote an average of 9½c. for the week.

Aluminum—Market reported quiet without any material change from last week. Business is being done on a basis of about 60c. for No. 1 ingots, New York.

Gold, Silver and Platinum

NEW YORK—Aug. 16

Gold—Somuel Montagu & Co.. report from London, under date of July 27, a total of bar gold received by the Bank of England during the week of £903,000. No withdrawals were reported. West African gold output for June, 1916, amounted to £127,107, and Rhodesian gold output for June, 1916, amounted to £333,070.

Transvaal Gold Production in June was 761,764 oz. For the six months ended June 30 the total was 4,631,867 oz., or $95,740,691; an increase of 223,819 oz., or $4,626,339, over the first half of last year. The course of production for the half-year indicates an output approximating $200,000,000 for the year.

Coined Silver in the United States July 1 is estimated by the Treasury Department as follows: Standard dollars, $568,270,900; subsidiary coins, $187,378,094; total, $755,648,994. Of the standard dollars, $490,786,334 are held in the Treasury against silver certificates outstanding.

Silver—The market has ruled steady the past week between 31⅝ and 31¾d. in London. Coinage orders for the English and French mints have been large enough to absorb silver offerings and hold the price firm.

Reports from India are favorable for good demand for silver, but conditions in China are not favorable for higher prices, exchange rates continuing below parity. Market closes steady in London, 31 1/16d.

Samuel Montagu & Co. report from London under date of July 27, that the tendency of prices has been somewhat better during the current week. Improvement have been mainly due to the former tone of China exchanges, which have shown reluctance to fall in sympathy with silver prices.

Bullion on hand at the San Francisco Mint at the close of July 31, 1916, was $370,535,105, an increase over July, 1915, of $69,225,685. Total gold receipts for the month, $5,383,463; silver receipts, $114,799. Australian gold bars received, $103,372; other sources, $5,280,091.

Imports of Silver in Great Britain six months ended June 30 were £6,359,785; exports, £3,939,492; excess of imports, £2,420,293, against £1,036,671 last year. Of the imports this year £5,138,953 were from the United States.

Gold and Silver Movement in the United States five months ended May 31 was:

	Gold		Silver	
	1915	1916	1915	1916
Exports	$4,761,000	$58,094,000	$20,880,000	$26,398,000
Imports	92,583,000	64,245,000	12,119,000	12,229,000
Excess	I. $87,822,000	I. $6,151,000	E. $8,761,000	E. $14,169,000

Imports of gold in June were heavy, so that the total for the half-year was probably greater than for the first half of last year.

Mexican Dollars in New York Aug. 10 were quoted at 51½@55½c.; Aug. 11 at 51@55c.; Aug. 12 at 51@55c.; Aug. 13 at 51@55c., Aug. 15 at 51¼c., and Aug. 16 at 51¼@55¼c. Not many pesos appeared.

Platinum—There was a little better demand for this metal. Quotations range from $55 to $60. Sales were reported at $58.50, which we quote as the average for the week.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 12—Quotations are given as follows: Blende, high price, $67.95 per ton of 60% zinc; premium ore at $65. Medium is $60@50; low, $45. Calamine, per ton of 40% zinc, $40@30. The average selling price of all grades of zinc is $57.94 per ton.

Lead base price is at $65 per ton of 80% metal content. The high price is $66.20, and the average selling price of all grades of lead is $64.33 per ton.

Shipments for the week ended Aug. 12 were 3,876.1 tons of blende and 932.33 tons of calamine and 934 tons of lead ore. Total value was $338,510 for the week, and $24,949,490 for the year to date.

Producers had thought the downward limit of zinc prices was touched a week ago, but another cut of $5 in the base price of premium ore was made this week. A tendency toward heavier buying by one concern tonight may have the effect of bringing the price slump to an end, though this company was offering only $60 base for 60% grades. It is assumed that no further cut can be made so long as this large buyer is in the field at a price so near the top. This company is not a regular buyer of high-grade ore.

These premises are estimated from the sellers viewpoint. Buyers, on the other hand, assume that with 20,000 tons surplus metal, over 20,000 tons surplus ore here, with surplus ore at the smelters and an unlimited supply in Australia, there is no early prospects of an advancing ore market.

Platteville, Wis.—Aug. 12—Quotations of the district are according to the following figures: Base price per 2,000-lb. ton for material assaying 60% zinc is $57 for premium ore down to $50 for medium grade. For material assaying 80% lead the base price per 2,000-lb. ton is $60@64. Shipments for the week were 2,190 tons of zinc ore and 104.3 tons of lead ore and 201.6 tons of sulphur ore. For the year, to date the figures are 73,723 tons zinc ore, 2,749 tons lead ore and 16,781 tons of sulphur ore. Shipped during the week to separating plants there were 3,239 tons of zinc ore.

OTHER ORES

Manganese Ore—Imports at Baltimore for the week included 15,800 tons of manganese ore from Brazil.

Pyrites—Imports at Baltimore for the week included 4,485 tons from Huelva, Spain.

Tungsten Ore—There was a slightly better feeling in this market, with, however, no great change in price, which we continue to quote at $20. Charles Hardy reports that the foreign demand for tungsten was again the dominating feature in the market. Considerable quantities were sold and at least 200 tons have been absorbed for shipment abroad since the actual buying began, about a fortnight ago. This buying is by no means confined to purchases made in the United States. Peru and Bolivia are also actively canvassed by the foreign buyers, and considerable quantities have been bought there. On July 19 Japan prohibited the exports of tungsten and molybdenum, except under license.

Antimony Ore—No business was reported and buyers were averse to making quotations.

Iron Trade Review

The domestic demand for finished materials is decreasing, owing, in large part, to high prices, labor shortage and slow deliveries. "Iron Age", Aug. 10, notes that following the statements by the leading producer one week ago that it had raised the price of steel bars $2 a ton, or to 2.60c., Pittsburgh, the same interests have announced similar advances in wire products and in contract plates and structural shapes. In a slow market these advances have not stimulated buying. Sales of bars have been made at 2.50c. in the week, pending business at that figure being more readily closed. Independent producers are in some cases quoting higher prices, but these have not been widely established. Manufacturing consumers of steel are facing smaller demand for their products in view of high prices. Implement makers count on 25% falling off in their sales and possibly more. They contend that bars should be reduced rather than advanced.

PITTSBURGH—Aug. 15

An unprecedented famine has developed in unfinished steel and buyers, English consumers in particular, are inquiring in vain for billets and sheet bars for any delivery this year. Prices are bid that would net greater profits than are obtainable on some descriptions of finished steel, light gage sheets in particular, but the mills prefer to carry the steel through to the finished product as any unemployment of men results in their securing jubs elsewhere and every employer is seeking to maintain his organization.

The Carnegie Steel Co.'s successive advances in bars, plates and shapes of $2 a ton are taking root, bars being already up to the 2.60c. price in the general market, while shapes and plates are making for 2.60c. and 3c. respectively. The independents have been closing additional contracts with regular customers before they advanced their prices.

The whole steel market has gained additional strength in the past week, and the change in the past three weeks is very striking, particularly as it occurs at the time of year when the market is supposed to reach its stage of greatest quietness. The change has been radical and the future of the steel market is assured for a longer period of time. It is now generally believed that the steel mills will be under pressure for deliveries, with prices strong all along the line, until at least the middle of next year, whereas two months ago there were doubts whether mill activity would be prolonged far into the new year and it was considered distinctly possible that some prices might begin receding in September or October.

The new life in the steel market is traceable chiefly to the war, there having been larger bookings of orders for shells and shell steel than were anticipated, while the common appraisement is that the war is destined to last for at least a year yet.

In practically all products the mills are nominally far behind in deliveries, but in most cases the condition arises from buyers having specified with exceptional liberality in anticipation of mills falling behind. There remain many instances in which consumers are really incommoded by not receiving as much steel as could be fabricated and put to use. It is believed that some consumers, who were particularly forehanded, are well stocked up, but there is no disposition to resell.

Pig Iron—While the pig-iron market on the surface appears dull, there is decidedly more buying of foundry and malleable grades, the buyers not putting out general inquiries, but picking up the iron quietly, apparently in fear of exciting the market to their disadvantage. There is slightly more inquiry for basic and it is thought possible that with the heavy selling of bessemer by Eastern furnaces, for export, the East may soon inquire of this district for basic iron. Bessemer is dull except for continued export demand, and the supply may run short. Prices are unchanged: Bessemer, $21@21.50; basic, $18@18.25; malleable and foundry, $18.25@18.50; forge, $18@18.25, f.o.b. valley furnaces, 95c. higher delivered Pittsburgh.

Steel—There is an altogether unprecedented famine in soft steel billets and sheet bars, both bessemer and openhearth. Only odd lots are offered, and then only occasionally. The mills without an exception refuse to quote on any regular tonnages, asserting that they are entirely sold up for this year. Prices are nominal at $45@50 for either bessemer or openhearth billets or sheet bars. The buying of shell steel has been much larger than expected, as it has continued to date when at the end of May the buying was supposed to be practically over for this year's delivery. Naturally the mills make an effort to hold capacity open for this profitable business and there is a bare possibility that should the buying of shell steel end the mills would find they could spare some soft steel. Rods are quotable nominally at $55@60.

FERROALLOYS

Market is inactive, purchasers being fairly well covered for time ahead.

Ferromanganese—The market for prompt is easier and in general it commands about the same price as contract, $175.

Spiegeleisen, 18 to 22%, is quoted at $45@50, and 25 to 30% at $55@65 at furnace. There is some inquiry for export.

Ferrosilicon, 50% is quoted at $88@89 in lots up to 100 tons; over 100 tons $87@88, and over 600 tons, $86@87, all f.o.b. Pittsburgh.

FOREIGN IRON

Report of Aug. 8, states that in pig iron the demand for forward delivery persists. Deliveries are closely regulated. Fears are expressed of greater tightness in hematite iron. Deliveries are inadequate and export business is curtailed. American 2-in. billets have sold at £13 15s. In the tin-plate market, 200,000 boxes of oil plates have been placed at 29s. to 30s. Sales later were made at 30s. 9d. The market is very irregular.

The "Gazette," London, of July 26, publishes a note of exports that have been prohibited that includes black plates for tinning (to all destinations except the Allies, Spain and Portugal), cast-iron pipe, galvanived corrugated and flat sheets, iron and steel plates and sheets (except black plates for tinning, tin plates, tinned plates and lead-coated sheets and sectional material for shipbuilding.) (To all destinations in Europe except the Allies, Spain and Portugal).

IRON ORE

The movement of iron ore down the lakes has been good up to date, and has equalled expectations, surpassing most of them. There have been some difficulties attending the movement, such as the danger of a strike of the lake carying vessels. Wages have been advanced largely and trouble averted by this means, but there is still apprehension in some quarters. The Mesabi strike is continuing and a great part of the underground production is cut off, but the disorder has not reached the openpit mines. Moving the tonnage has been the first consideration, so that ore grade has probably suffered. Special consumers have offered premiums for ore lately, in some cases up to 50c. or more per ton. Shortage of ores for blast furnaces is not likely, although it is a possibility. Furnaces are not disposed to quote on pig iron for the first half of 1917, due to this possibility. Total ore on docks on Aug. 1 was 4,810,671 tons, as compared with 6,539,933 tons on Aug. 1, 1915. Shipments from lower lake ports to furnaces during the month amounted to 5,289,590 tons.

COKE

There is reported a steady hardening of prices of spot furnace coke market. The stiffness is due to light production, and future prospects brighten as time of completion of additional byproduct ovens is prolonged. The "Courier" reports that the total production for week ended Aug. 5 was 394,200 net tons, and shipments of 10,960 cars.

Connellsville—While demand for prompt furnace coke from consumers is barely in evidence there is buying by middle interests to apply on contracts, with very light offerings, and the market is strong at $2.75@2.85. There is no interest in contract coke. The Youngstown Sheet and Tube Co. expects to begin putting the first two batteries of its byproduct coke plant in operation today or tomorrow, the other two batteries, making 204 ovens in all, to follow next week. This company is now receiving about 70,000 tons of Connellsville coke per month, the contracts being arranged to change to coal contracts. Ovens will be blown out to the extent of 20 to 35,000 tons a month of coke, but at least 35,000 tons a month will remain available for other consumers, and the coke market should therefore ease off in time.

PETROLEUM

It is reported, under date of Aug. 10, that a further cut of 10c. per bbl. in Mid-Continent crude oil is the fourth successive reduction since July 24 last. Mid-Continent crude, now quoted at $1.15 per bbl., is 40c. below the high of this year, and indications point to additional recessions before the low is reached. Texas oil, which is in direct competition with Oklahoma, also has been reduced 10c. per bbl. to the $1.15 basis. Pennsylvania, as well controlled as this eastern field is, will be unable to escape the influence of the Mid-Continent market, it is expected. There are 81,000,000 bbl. of oil in storage in the Mid-Continent field, half owned by Prairie Oil and Gas Co. Total storage shows a decrease in value of more than $32,000,000 at present market price, compared with high this year. Prairie's theoretical loss alone amounts to more than $16,000,000.

California valley: 14 to and including 17.9 gravity, 63c. per bbl.; 18 to and including 18.9 gravity, 64c. For each increase in gravity above 18, one cent a barrel increase is made. Southern: 16 and including 17.9 gravity, 63c.; 18 and including 18.9 gravity, 64c. One cent a barrel is added for each degree increase in gravity above 18.

Chemicals

NEW YORK—Aug. 15

Arsenic—With spot quoted at only $6 per 100 lb., absence of important demand is apparently responsible for a lack of upward tendency in prices. Production is stated to be well sold ahead and contract deliveries are big enough to prevent any accumulations.

Copper Sulphate—Market quiet with only a moderate business in small lots reported for the last week. Export trade dull and domestic consumers apparently content to buy in small installments. Prices quoted at $8@10 per 100 lb.

Bleaching Powder—Reported that resales of offerings are keeping spot market unsettled. Difficult to sell large drums at present and these are sellers at 4½c. per lb. Export packages held at 5½@6½c. per lb. Contracts for next year are quoted at 2½@2¾c. per lb.

Sulphur—Prices showing a tendency to harden as a result of consumers' strong demand. New York shipments quoted at $30 per long ton and Baltimore at $30.50. Spot quoted at $35.

Sulphuric Acid—Prices for nearby deliveries steady with some concessions on long-time contracts. Offerings of 66-deg. at 1½c. per lb. reported, with 60-deg. at 1c. per lb. available to buyers.

Assessments

Company	Delinq.	Sale	Amt.
Algomah, Mich.	May 18	.....	$1.00
Alta Silver, Nev.	Sept. 1	Sept. 25	0.03
Beaver Gold, Utah	Aug. 19	Sept. 16	0.01
Belmont, Ida.	Aug. 9	Aug. 26	0.006
Challenge, Nev.	Aug. 23	Sept. 13	0.05
Clear Grit, Ida.	Aug. 7	Aug. 25	0.002
Coal Creek, Ida.	Aug. 25	Sept. 26	0.005
Cons. Virginia, Nev.	July 27	Aug. 17	0.05
Exchequer, Nev.	Sept. 5	Sept. 26	0.03
Emerald, Utah.	Aug. 15	Sept. 9	0.00½
Friend, Ida.	Aug. 26	Sept. 16	0.002
Four Timbers, Ida.	July 26	Aug. 26	0.002
Great Bend, Nev.	Aug. 15	Sept. 20	0.01
Hector, Ida.	Aug. 7	Sept. 15	0.005
Hope, Calif.	July 17	Aug. 14	0.01
Hugo, Ida.	July 29	Aug. 30	0.002
Jacket-C.Point-Belcher, Nev.	Aug. 14	Sept. 7	0.05
Jack Waite, Ida.	July 27	Aug. 28	0.01
Kewanas Reor., Nev.	Aug. 2	Sept. 6	0.01
Keweenaw, Mich.	Sept. 2	.....	1.00
Lehi Tintic, Utah.	Aug. 5	Aug. 25	0.0025
Lucky Calumet, Ida.	July 20	Aug. 21	0.005
Nevada-Douglas, Nev.	July 15	Aug. 16	0.10
Nevada-Stewart, Ida.	A 3	Sept. 2	0 003
Nevada Zinc, Nev.	Aug. 14	Sept. 2	0.01
North Lake, Mich.	June 14	.....	1.00
Ophir, Nev.	Aug. 16	Sept. 6	0.05
Paloma, Utah	Aug. 21	Sept. 9	0.01
Phedora, Ida.	Aug. 29	Sept. 29	0.001
Rico Argentine, Colo.	Aug. 17	Sept. 2	0.01
Rio Grande Grubstake, Nev.	June 22	Aug. 31	0.002
Sandstorm Kendall, Nev.	Aug. 22	Sept. 26	0.01
Silver Pick, Nev.	July 5	Aug. 14	0.01
Sixes, Nev.	Aug. 23	Sept. 8	0.10
Springfield Tunnel, Calif.	Aug. 15	.....	0.05
Sunrise, Ida.	July 27	Aug. 28	0.002
Sunset, Ida.	Aug. 5	Aug. 26	0.0015
Tar Baby, Utah.	Aug. 3	Sept. 4	0.01
Ton. Gypsy Queen, Nev.	July 11	Aug. 15	0.01
Utah, United, Utah	Aug. 12	Aug. 30	0.01
Wolf Mt. Copper, Utah.	Aug. 2	Sept. 6	0.005
Wonderful, Ida.	Aug. 30	Sept. 20	0.001

Stock Quotations

SAN FRANCISCO Aug. 16	
Name of Comp.	Bid.
Alta	$ .03
Andes	.09
Best & Belcher	.06
Bullion	.01
Caledonia	$ .40
Challenge Con.	$ .03
Confidence	.18
Cons. Imperial	.01
Con. Virginia	$ .13
Gould & Curry	.03
Hale & Norcross	.06
Jacket-Cr. Pt.	$ .05
Mexican	.17
Occidental	.70
Ophir	.24
Overman	$ .04
Savage	.04
Seg Belcher	.02
Sierra Nevada	.31
Union Con.	.67
Utah Con.	.01
Belmont	4.25
Jim Butler	.88
MacNamara	.05
Midway	.20
Mont.-Tonopah	.23
North Star	.15
Rescue Eula	.25
West End Con.	.80
Atlanta	.09
Blue Bell	$ .01
Booth	.13
C.O.D. Con	.03
Comb. Frac	.06
D'field B.B.	.03
D'field Daisy	$ .03
Jumbo Extension	.07
Pitts.-Silver Peak	$ .12
Round Mountain	.45
Sandstorm Kendall	.04
Silver Pick	.11
Central Eureka	$ .09
Argo	$ .10
Ariz. Central	$ .10
Big Jim	.85
Lazy Boy	$ .12
Oatman No. Star	$ .10
Tom Reed	$1.55
United Eastern	3.62½
United Western	$ .08

LONDON	Aug. 4
Alaska Tre'dwell	£5 15s 0d
Burma Corp.	3 5 0
Cam & Motor	0 10 7½
Camp Bird	0 8 3
El Oro	0 8 3
Esperanza	0 11 0
Mexico Mines	3 17 6
Nechi, pfd.	0 15 3
Oroville	0 17 0
Santa Gert'dis.	0 12 0
Tomboy	1 2 0

SALT LAKE Aug. 16	
Name of Comp.	Bid.
Alta Con.	$ 21½
Black Jack	$ .05½
Colorado Mining	$ .15
Crown Point	.03
Daly-Judge	7.75
Emma Cop.	$ .54
Gold Chain	.20
Grand Central	.65
Iron Blossom	1.50
Lower Mammoth	.03
May Day	.10½
Opohongo	$ .01½
Prince Con.	1.50
Seven Troughs	$ .03½
Silver King Coal'n	2.90
Silver King Con.	3.32½
Sioux Con.	.09
Uncle Sam	.06
Yankee	.18

COLO. SPRINGS Aug. 16	
Acacia	$ .02¾
Doctor Jack Pot	.09½
Elkton Con.	.14½
El Paso	.60
Findlay	.03
Gold Sovereign	.04½
Golden Cycle	2.07½
Granite	.64
Isabella	.17
Jack Pot	.05
Jerry Johnson	$ .03½
Mary McKinney	.28
Portland	1.68
Vindicator	2.12

TORONTO Aug. 16	
Adanac	$ .75
Bailey	.07½
Chambers Ferland	.19
Coniagas	4.45
La Rose	.55
Peterson Lake	.23
Right of Way	.04
Seneca Superior	.28
T. & Hudson Bay	55.00
Temiskaming	.60
Trethewey	$ .21
Wettlaufer-Lor.	.15
Dome Exten.	.36½
Dome Lake	.42
Foley O'Brien	.50
Hollinger	28.10
Jupiter	.27
McIntyre	1.36
Newray	.48½
Porcu. Crown	.65
Preston E. D.	$ .03
Vipond	$ .41
West Dome	.40½

N. Y. EXCH. Aug. 16	
Name of Comp.	Clg.
Alaska Gold M.	17
Alaska Juneau	$7¼
Am.Sm.&Ref.,com	98
Am. Sm. & Ref., pf.	$111½
Am. Sm. Sec., pf. A	93
Am. Sm. Sec., pf. B	$84
Am. Zinc	32
Am. Zinc, pf.	65
Anaconda	83¾
Batopilas Min.	1¾
Bethlehem Steel	465
Bethlehem Steel, pf.	125
Butte & Superior	67½
Chile Cop.	20½
Chino	50½
Colo. Fuel & Iron	45
Crucible Steel	72½
Dome Mines	$25¾
Federal M. & S.	$13
Federal M. & S., pf.	$35½
Great Nor., ore ctf.	86½
Greene Cananea	45¾
Homestake	$130
Inspiration Con.	51½
International Nickel	44¾
Kennecott	49½
Lackawanna Steel	72½
Miami Copper	34¾
Nat'l Lead, com.	65
National Lead, pf.	$112¾
Nev. Consol.	18¾
Ontario Min.	$5¾
Quicksilver	2½
Quicksilver, pf.	4½
Ray Con.	24½
Republic I&S, com.	48½
Republic I&S, pf.	112
Sloss-Sheffield	45
Tennessee Copper	25½
Utah Copper	81
U. S. Steel, com.	89
U. S. Steel, pf.	117¾
Va. Iron C. & C.	$44

N. Y. CURB Aug. 16	
Beaver Con.	$ 36
Buffalo Mines	$ 85
Butte & N. Y.	1½
Butte C. & Z.	5½
Caledonia	.58
Can. Cop. Corpn.	1½
Cashboy	.04½
Cerro de Pasco	36½
Con. Ariz. Sm.	1½
Con. Coppermines	$1¾
Con. Nev.-Utah	$ 1/16
Crystal Cop.	1/16
First Nat. Cop.	4
Florence	$ .75
Goldfield Con.	.81
Goldfield Merger	.08½
Granite	$ 20
Hecla Min.	5
Howe Sound	4¾
Jerome Verde	1 3/16
Joplin Ore & Spel.	$ .45
Kerr Lake	$4½
Magma	15
Majestic	$ 3/16
McKinley-Dar-Sa.	$ .60
Mother Lode	.30½
Nevada Hills	$ .15
N. Y. & Hond.	15¾
Nipissing Mines	$6¾
Oro	$ .04
Ray Hercules	3½
Rochester Mines	.64
St. Joseph Lead	$15½
Standard S. L.	1 3/16
Stewart	.25
Success	.34
Tonopah	$5½
Tonopah Ex.	5½
Tribullion	1/16
United Zinc	$6
White Knob, pf.	$1½
White Oaks	5½
Yukon Gold	$2 1/16

BOSTON EXCH Aug. 16	
Name of Comp.	Bid
Adventure	3
Ahmeek	99
Algomah	1½
Alloues	59½
Ariz. Com., ptfs.	9½
Bonanza	.25
Butte-Balaklava	1½
Calumet & Ariz.	70½
Calumet & Hecla	525
Centennial	15
Copper Range	63½
Daly West	2½
East Butte	13
Franklin	7½
Granby	87
Hancock	14
Helvetia	.25
Indiana	3½
Island Cr'k, com.	47
Island Cr'k, pfd.	88½
Isle Royale	$27
Keweenaw	3¾
Lake	13½
La Salle	4
Mason Valley	2
Mass	13¾
Mayflower	3
Michigan	3½
Mohawk	91
New Arcadian	6
New Idria	11¾
North Butte	22¾
North Lake	2½
Ojibway	1½
Old Colony	2½
Old Dominion	69
Osceola	88½
Quincy	88½
St. Mary's M. L.	76½
Santa Fe	1¾
Shannon	8½
Shattuck-Ariz.	27¾
So. Lake	6¾
So. Utah	.23
Superior	16½
Superior & Bost.	4
Tamarack	39
Trinity	5¾
Tuolumne	.35
U. S. Smelting	71½
U. S. Smelt'g, pf.	50½
Utah Apex	3 15/16
Utah Con.	81
Utah Metal	8½
Victoria	3 5/16
Winona	5½
Wolverine	51½
Wyandot	1¾

BOSTON CURB Aug. 16	
Bingham Mines	10
Boston Ely	.99
Boston & Mont.	.82
Butte & Lon'n Dev.	.58
Calaveras	4¾
Calumet-Corbin	.02½
Chief Con.	1¾
Cortez	.30
Crown Reserve	.35
Davis-Daly	1¾
Eagle & Blue Bell	1¾
Houghton Copper	1¾
Iron Cap Cop., pf.	6
Mexican Metals	.27
Mines of America	$2½
Mojave Tungsten	3¾
Nat. Zinc & Lead	63
Nevada-Douglas	1
New Baltic	1¾
New Cornelia	13½
Ohio Copper	.C5
Oneco	.80
Raven Copper	$ 05
Rex Cons.	.20
Rilla	.18
United Verde Ext.	31½

‡Last Quotations.

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1914	1915	1916	1914	1915	1916
January	56.572	48.855	56.775	26.553	22.731	26.960
February	57.506	48.477	56.755	26.573	22.753	26.975
March	58.067	50.241	57.935	26.788	23.708	27.597
April	58.519	50.250	64.415	26.958	23.709	30.662
May	58.175	49.915	74.269	26.704	23.570	35.477
June	56.471	49.034	65.024	25.948	23.267	31.060
July	54.678	47.519	62.940	25.219	22.597	30.000
August	54.344	47.163	.....	25.979	22.780	.....
September	53.290	48.680	.....	24.260	23.591	.....
October	50.654	49.385	.....	23.199	23.925	.....
November	49.082	51.714	.....	22.703	25.094	.....
December	49.375	54.971	.....	22.900	26.373	.....
Year	54.811	49.684	.....	25.314	23.675	.....

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York Electrolytic		London Standard		London Electrolytic	
	1915	1916	1915	1916	1915	1916
Jan.	13.641	24.008	60.756	88.083	65.719	116.167
Feb.	14.394	26.440	63.494	102.667	*	133.167
Mar.	14.787	26.310	66.152	107.714	*	136.000
April	16.811	27.895	75.096	124.319	*	137.389
May	18.506	28.625	77.600	135.457	*	152.522
June	19.477	26.601	82.574	112.432	95.333	137.455
July	18.796	23.865	76.011	95.119	91.409	125.500
Aug.	16.941	.....	68.673	.....	82.333	.....
Sept.	17.502	.....	68.915	.....	85.250	.....
Oct.	17.686	.....	72.601	.....	88.000	.....
Nov.	18.627	.....	77.744	.....	93.273	.....
Dec.	20.133	.....	80.773	.....	100.43	.....
Year	17.275	.....	72.532	.....	.....	.....

TIN

Month	New York		London	
	1915	1916	1915	1916
January	34.260	41.825	156.550	175.548
February	37.415	42.717	176.925	181.107
March	48.426	50.741	180.141	193.609
April	47.884	51.230	166.225	199.736
May	38.790	49.125	162.675	196.511
June	40.288	42.231	167.636	179.466
July	37.423	38.510	167.080	168.357
August	34.389	.....	151.440	.....
September	33.125	.....	152.625	.....
October	33.080	.....	151.554	.....
November	39.224	.....	167.670	.....
December	38.779	.....	167.000	.....
Av. year	38.590	.....	163.960	.....

LEAD

Month	New York		St. Louis		London	
	1915	1916	1915	1916	1915	1916
January	3.729	5.921	3.548	5.826	18.606	31.167
February	3.827	6.246	3.718	6.164	19.122	31.988
March	4.053	7.136	3.997	7.375	21.883	34.440
April	4.221	7.630	4.142	7.655	21.094	34.368
May	4.274	7.463	4.182	7.332	20.347	32.967
June	5.932	6.936	5.836	6.749	25.170	31.011
July	5.659	6.352	5.531	6.185	24.611	28.137
August	4.656	.....	4.520	.....	21.946	.....
September	4.610	.....	4.490	.....	23.151	.....
October	4.600	.....	4.499	.....	23.994	.....
November	5.155	.....	5.078	.....	26.278	.....
December	5.355	.....	5.266	.....	28.807	.....
Year	4.673	.....	4.567	.....	22.917	.....

SPELTER

Month	New York		St. Louis		London	
	1915	1916	1915	1916	1915	1916
Jan.	6.386	16.915	6.211	16.745	30.844	89.810
Feb.	8.436	18.420	8.255	18.260	39.819	97.762
Mar.	8.541	16.846	8.360	16.676	44.141	95.048
April	10.012	16.695	9 837	16.525	49.888	99.056
May	14.781	14.276	14.610	14.106	68.100	94 2:7
June	21.208	11.752	21.038	11 582	100.614	68 591
July	19.026	8.925	18.856	8.755	97.250	50.750
Aug.	12.781	.....	12.611	.....	67.786	.....
Sept.	13.440	.....	13.270	.....	67.841	.....
Oct.	12.800	.....	12.596	.....	66.536	.....
Nov.	15.962	.....	15.792	.....	88.409	.....
Dec.	15.391	.....	15.221	.....	89.400	.....
Year	13.230	.....	13.054	.....	67.553	.....

New York and St. Louis quotations, cents per pound, London, pounds sterling per long ton. * Not reported.

PIG IRON IN PITTSBURGH

Month	Bessemer‡		Basic‡		No. 2 Foundry	
	1915	1916	1915	1916	1915	1916
January	$14.59	$21.60	$13.45	$18.78	$13.90	$19.70
February	14.55	21.16	13.45	18.93	13.90	19.51
March	14.55	21.81	13.45	19.20	13.95	19.45
April	14.55	21.65	13.45	18.95	13.95	19.45
May	14.61	21.78	13.60	19.11	13.83	19.58
June	14.70	21.95	13.67	18.95	13.77	19 34
July	14.94	21.95	13.91	18.95	13.68	19.20
August	16.01	.....	15.31	.....	14.75	.....
September	16.86	.....	15.95	.....	15.70	.....
October	16.95	.....	15.96	.....	15.80	.....
November	17 57	.....	16.47	.....	17.20	.....
December	19.97	.....	18.44	.....	18.95	.....
Year	$15.82	.....	$14.76	.....	$14.95	.....

‡As reported by W. P. Snyder & Co.